THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXII. No. 1839.] LONDON, AUGUST 9, 1898. [50TH YEAR. PRICE 6d.

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FOR
GAS, STEAM, WATER,
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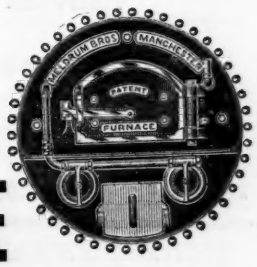

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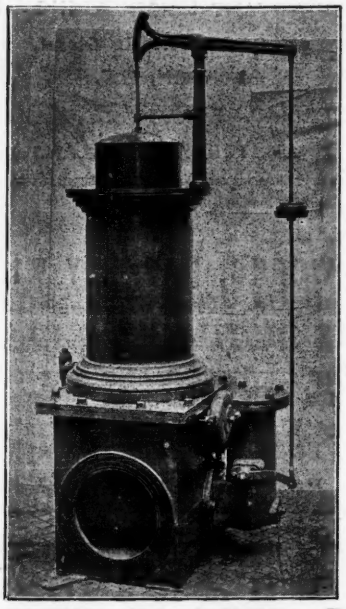

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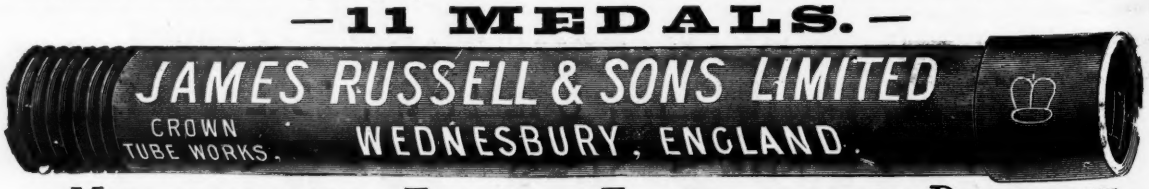

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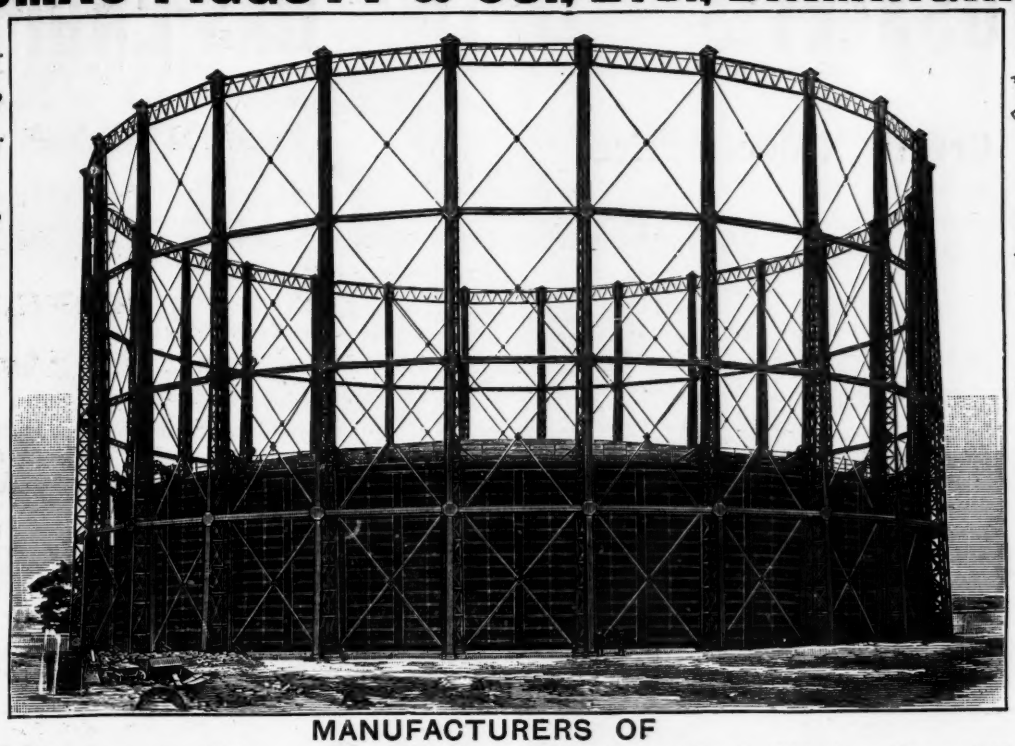

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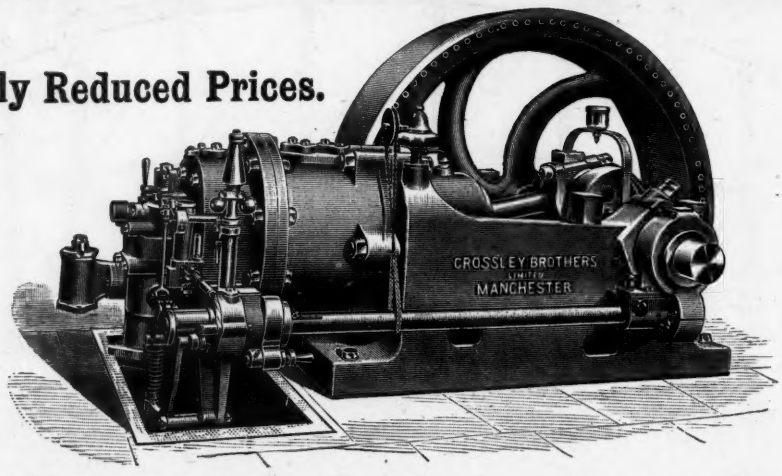

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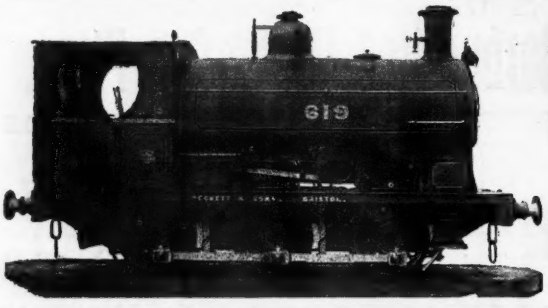

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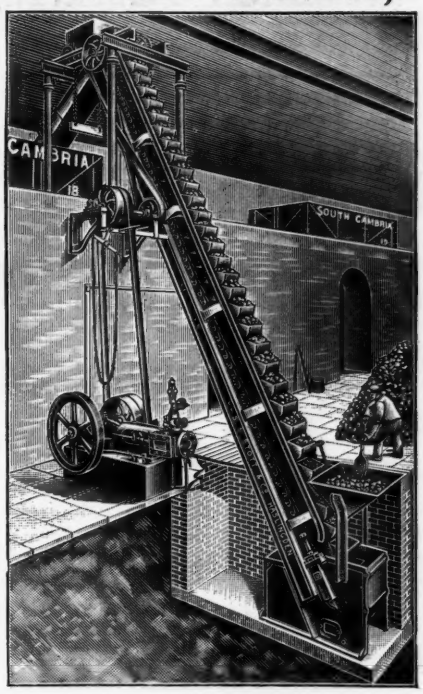

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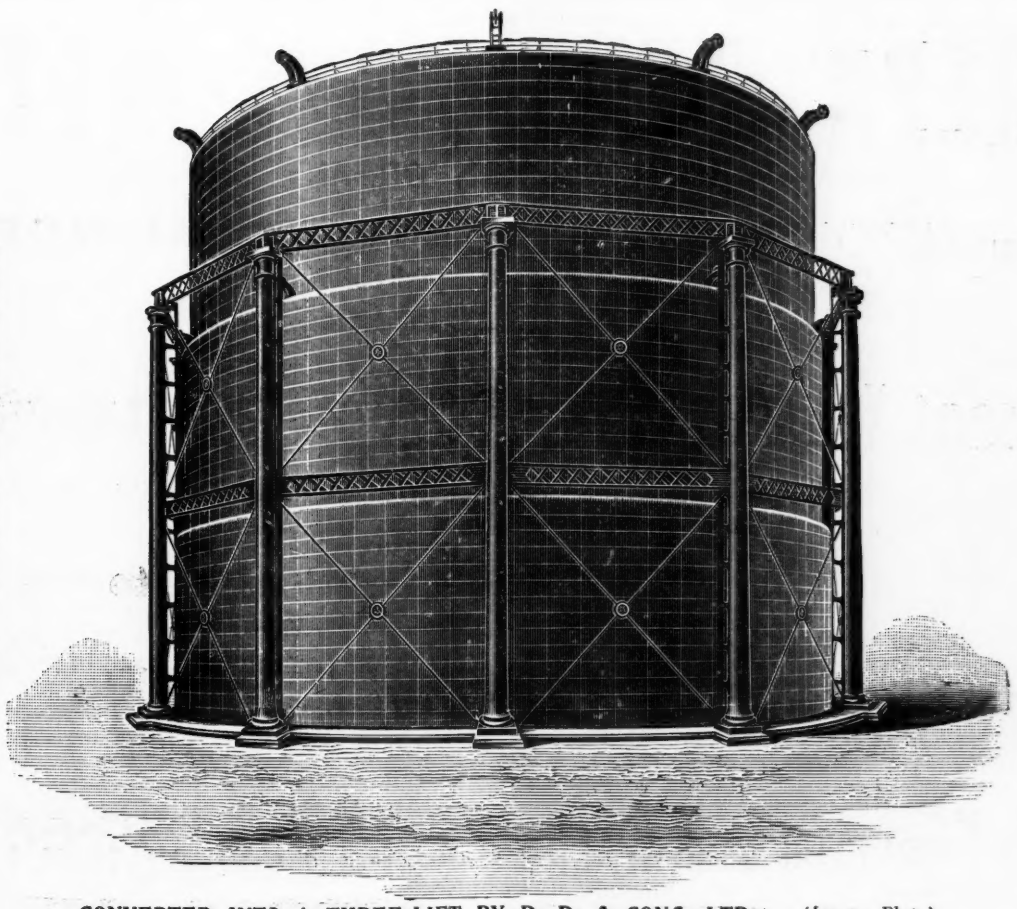

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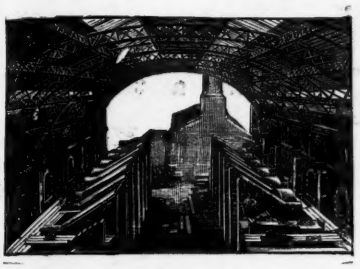

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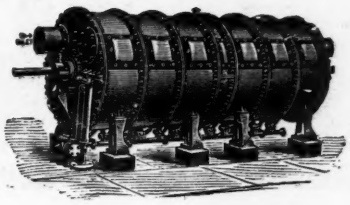

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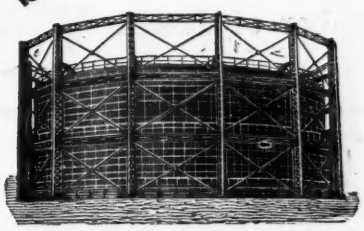

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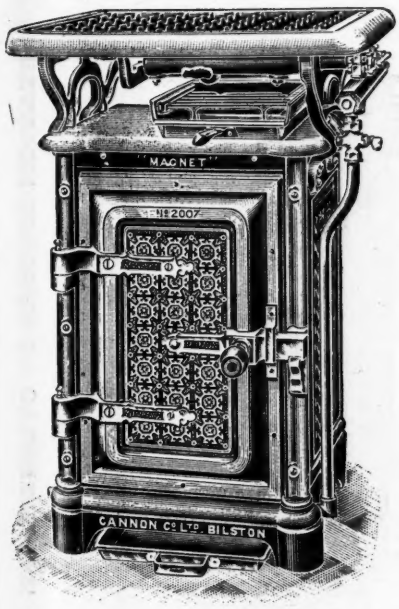

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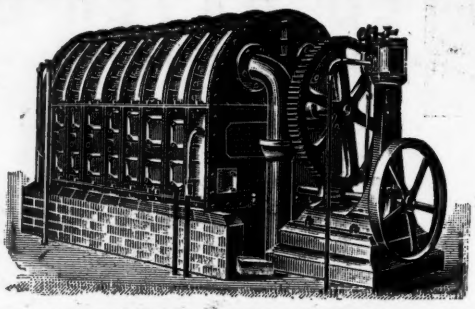

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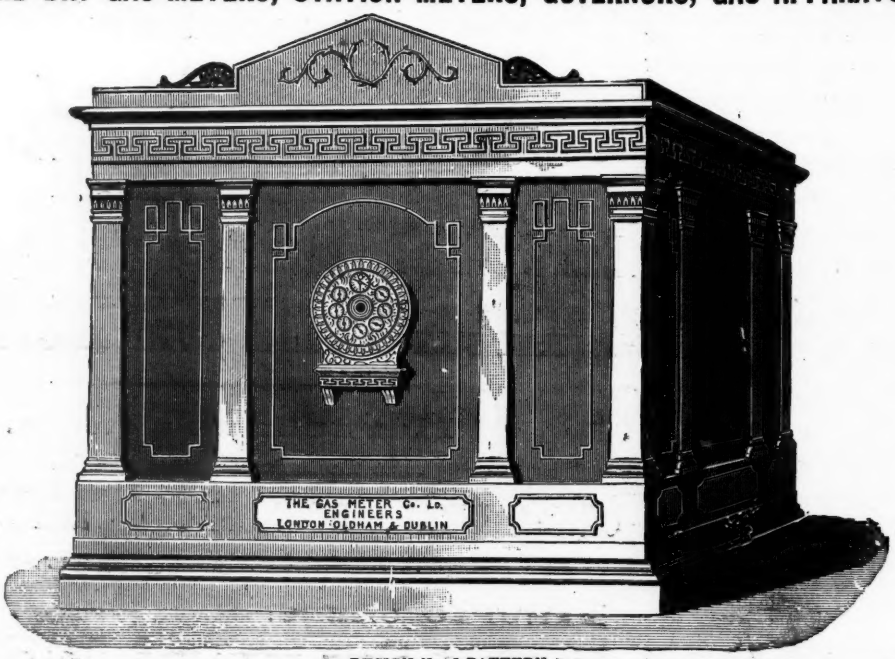
SQUARE STATION METERS WITH PLANED JOINTS.



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Belfast	1,700,000	Guildford	350,000
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Brussels	700,000	Syracuse, N.Y.	850,000
Brussels (Second Contract)	700,000	Brentford	1,200,000
Liverpool	3,500,000	Commercial Gas Co.	850,000
Liverpool (Second Contract)	4,500,000	Commercial Gas Co. (Second Contract)	850,000
Tottenham	750,000	Commercial Gas Co. (Third Contract)	1,250,000
Tottenham (Second Contract)	750,000	Bridlington	125,000
Santiago	400,000	Middlesbrough	1,250,000
Swansea	750,000	Croydon	1,250,000
Manchester	3,000,000	L. & N.W. Railway, Crewe	700,000
Brighton	1,750,000	Taunton	225,000
Preston	1,500,000	Lawrence, Mass.	400,000
New York	1,200,000	Rotterdam	850,000
Southport	750,000	Dorking	125,000
Bath	1,000,000	McKeesport, Pa.	500,000
Newburgh, N.Y.	350,000	The Gaslight and Coke Co., Bromley	3,750,000
Newburgh, N.Y. (Second Contract)	250,000	The Gaslight and Coke Co., Nine Elms	2,750,000
Hoylake	125,000	Durham	200,000
Coventry	600,000	New York (Remodelled)	11,000,000
Coventry (Second Contract)	600,000	Scarborough	800,000
Bordentown, N.J.	125,000	Perth, W.A.	125,000
Winchester	200,000	Bremen	550,000
Shanghai	225,000	Maidenhead	225,000
Stockport	500,000	Epsom	225,000
Norwich	1,000,000	North Middlesex	150,000
Holyoke, Mass.	600,000	Wandsworth and Putney	1,800,000
St, Joseph, Mo.	750,000	Aarhus	800,000
Lea Bridge	350,000	Falmouth	150,000
Lea Bridge (Second Contract)	350,000		

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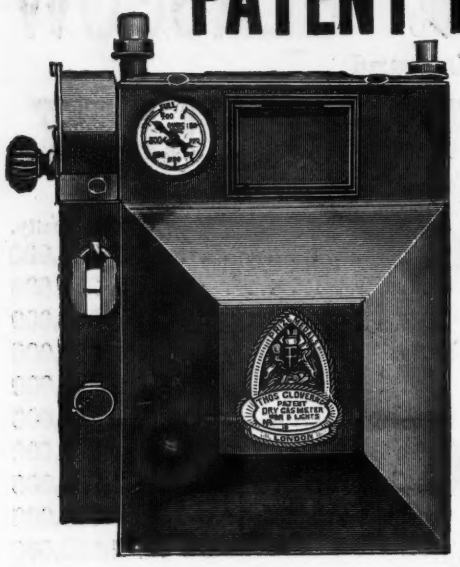

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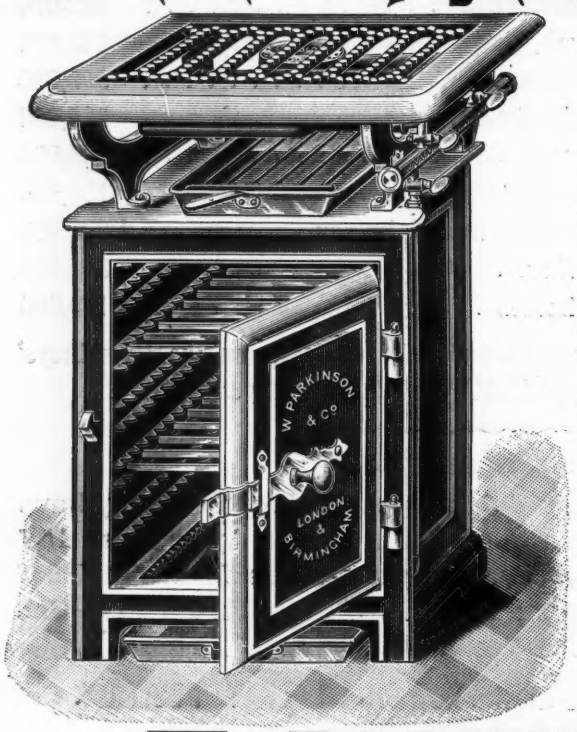

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

EDITORIAL NOTES.

The Chartered Meeting.

THE meeting of the proprietors of The Gaslight and Coke Company on Friday last will be found reported in another column; and as, from motives of economy and others, the Directors of the Company do not see their way to follow the South Metropolitan practice of sending out with the dividend warrants an authenticated transcript of the proceedings at these meetings, we are sorry to say that those proprietors who do not happen to see the "JOURNAL" will not be able to form a clear idea of how matters are going with this vast undertaking. It is a strange commentary upon the oft-repeated declaration of the Governor that the Administration of the Company have nothing to conceal, and court the fullest investigation of their proceedings, that the Directors should deliberately deny those proprietors who do not make the half-yearly pilgrimage into the purlieus of old Westminster the means of informing themselves as to what goes on at the general meetings. It is not that the majority of the proprietors would ever take an intelligent interest in the conduct of the business from which they derive their dividends, by reason of their having a report of the proceedings of the meeting placed in their hands. It is one of the evils of the joint-stock company principle of trading that shareholders usually have to rest content with opening their mouths for their dividends, and shutting their eyes to the means whereby the profits are earned. Really competent critics of a Gas Company, or of any other great statutory concern, must always be few; but it is not the part of a self-respecting directorate to shirk the painful duty of making their nominal constituents acquainted betimes with the worst as well as with the best that can be said of them in their official capacity.

And, if one may credit Colonel Makins, the Directors of The Gaslight and Coke Company are a real mirror of rectitude and boldness in doing what they esteem to be their duty, in scorn of such considerations as opportuneness or what the world thinks. Their nerve, when it comes to selling the dearest gas in the kingdom for the quantity, or of clinching a bargain for a year's supply of coal at top market rates, is like that of the Duke of Plaza Toro. Why should they be afraid? Parliament will not go back upon the sliding-scale bargain; and as to what further restrictions may be placed upon future capital issues, the holders of the existing capital need not trouble themselves. It is no concern of theirs. Moreover, there is nothing in the bogey of purchase by a public authority. "The London County "Council have to reckon with the Water Companies first!" Let us put up the price of gas to cover our red-taped commercial methods. We are a *quasi* Department of State, and whoever heard of Government business being done upon ordinary trade principles? It is a little annoying, but utterly useless, for pestilent agitators like Mr. George Livesey to attend these meetings and convict the present Administration of squandering capital, crippling the business, and being incapable either of buying or selling to advantage. The proprietors do not care for any of these things; or if some of them do, they are but an insignificant handful.

Such are some of the reflections suggested by Friday's proceedings. The Governor, flippantly, as is his manner, remarked that there is so much groaning at the Administration from without, that indulgence in just a little optimism within the Horseferry Road circle is pardonable. But what insensate, not to say blind, optimism pervades every communication from the Chartered chair! Everything is "satisfactory," according to the official view. If the price of gas is raised, it is in the interest of the consumers as much as on any other account. When the management succeeds in doing as well as other Gas Companies in any particular, it is "satisfactory." When a transaction is found to be very much worse than a similar one carried through by other hands, it is still more "satisfactory." Does Parliament manifest a desire to know how the Company stand with the public? How gratifying! Perhaps the silent dispersal of the proprietors on Friday without passing the customary vote of thanks to the Board who have presented them with a reduced dividend, and stirred up more discontent against the undertaking than has been shown during the past quarter of a century, is far more "satisfactory" than anything mentioned in the glozing sentences of the Governor.

It is impossible to leave this subject without mention of the personal element in the Horseferry Road problem. Hitherto the contest over the huge body of the undertaking has been between Mr. Livesey on the one side and the Governor and General Manager on the other. On Friday last it was enlarged to include Mr. Corbet Woodall, whom Mr. Livesey, by implication, claimed to be upon his side. Much sympathy will be felt for Mr. Woodall in the awkward position thus created for him. On Friday he had to sit silent while his name was being bandied between the powerful critic in the body of the meeting, and the mouthpiece of the Board in the chair. Mr. Livesey accused the Board—that is, the Governor—of taking advantage of the lamented death of the Hon. Henry Noel to neutralize the expert in the person of Mr. Woodall by rushing in a typical professional Director in the person of Mr. John Miles. In making this serious charge, Mr. Livesey used the phrase "indecent haste" to stigmatize the fashion of the appointment, and ignored the appeal of the Governor to withdraw the epithet. But inasmuch as there was a little disagreement between the Governor and Mr. Livesey upon the fact of the period of time that was allowed to elapse between the occurrence of the vacancy and its being filled, the question of the fitting phraseology for describing the proceeding remained open.

Altogether, it must be concluded that if the whole of the Directors of The Gaslight and Coke Company parted on Friday upon good terms with themselves, they must be easily pleased. There is a pungent political saying, with which the Governor, as a "*quasi*-statesman," must be familiar. It is that "anybody can govern with a state of "siege." For "state of siege" read "power to increase "the selling price and diminish the dividend;" and here is the secret of the "satisfactory" administration of The Gaslight and Coke Company by its present chiefs.

Gasholders and the Law of Nuisance.

JUDGMENT has at last been delivered in the action of *Jordeson v. The Sutton, Southcoates, and Drypool Gas Company*, reported in the "JOURNAL" in February last, when it was heard by Mr. Justice North, sitting without a jury. Some issues of fact were decided at the time, as will be found recorded in our issue for Feb. 22 (p. 410). One of these was as to the effect of the erection of a holder 105 feet high upon the light previously enjoyed by the plaintiff's cottages in the vicinity; and another was as to whether the construction of the tank for the holder had been carried out without negligence, in the legal sense of the term. The points reserved for consideration had respect to the difficult legal question of the liability of the undertakers for the consequences of acts done by them in the exercise of their statutory powers. His Lordship has now completed his judgment; and it is against the Company on all the issues. Having decided that the erection of a gasholder to the proposed height of 105 feet would interfere with the access of light to the neighbouring cottages, the Judge finds that this would be an unjustifiable nuisance. An injunction accordingly issues; but it is not to prevent the Company from raising their holder to the height of 68 feet from the ground-level. The work of constructing the tank was not negligently done; but still, in his Lordship's opinion, a considerable amount of injury was inflicted thereby upon the plaintiff's property, for which he ought to be compensated. Accordingly he gets £340 for damages; the amount being assessed by the Judge himself, by request. The main line of the Company's defence was that their Acts of Parliament conferred upon them an absolute right and duty to do what was complained of upon this very site. But the proposition has failed. It is of the greatest importance that the reasons for the failure should be studied. The statutory obligation to supply gas carries with it certain rights; but the rights are not such as would warrant the particular acts brought into question. This is the gist of the whole judgment. It is an instance of judicial arguing from the general sanction to the particular application. A Gas Company must erect holders. True; but they need not erect them in utter disregard of the rights of other people to light for their houses and support for their land. It is therefore held that the case in point is governed by the class of decisions of which *The Metropolitan Asylums Board v. Hill* is an example; and not by the class of cases to which *The London, Brighton, and South Coast Railway Company v. Truman* belongs. That is to say, the right of the Company in this connection is permissive, not obligatory. The former of these leading cases is discussed, in agreement with Mr. Justice North's reading, in "Michael and Will" (4th ed., p. 193); but the other case is merely mentioned as a contrast. Hence we must understand for the future that section 29 of the Gas-Works Clauses Act, 1847, is fraught with weighty significance, reinforced as it is by section 9 of the Act of 1871, which says that "nothing in this or the Special Act shall "exonerate the undertakers from any indictment, action, "or other proceeding for nuisance, in the event of any "nuisance being caused by them." The only grain of comfort to be gathered from Mr. Justice North's decision is that there must be specific damage done to give cause of action. The moral of the case is that gas undertakers should agree with their neighbours wherever possible, and be careful not to rely too confidently upon their statutory privileges.

The Evil of "Cadging" in the Gas Trade.

IN a recent issue of the "Ironmonger," the editorial notes (which, by the way, are as usual particularly well written) are devoted to the "Ethics of Cadging." The motive of this disquisition is the seasonable recurrence of "that "peculiar institution known as the beanfeast or wayz-"goose." It is, of course, possible to discuss this feature of the life of the British workman from various points of view. As a rule, our contemporary admits that the institution is an evidence both of the determination of the British workman to enjoy himself on occasion in his own manner, and also of his readiness to pay for his enjoyment like a man. If the day's pleasure is provided at the expense of the employer, which is often the case, it is again a subject for pleasant reflections, as exhibiting the kindly relationship that prevails, generally speaking, between the work-giver and the worker of this country. But there is another aspect of the "beanfeast," which is not so pleasant to contemplate. There exists in some quarters, and in particular trades, a bad custom of begging from business customers, agents of wholesale firms, and others, for subscriptions towards the cost of these jollifications. As our contemporary says, the moving agent in this degrading performance is some foreman or clerk; and not infrequently the firm's business letter-paper is used for conducting this "cadging foray." Specimens of several of these begging letters are given; but one glaring example will suffice. It is "a lengthy letter, written in a nice clerkly hand on "business paper, and signed by a foreman." The writer begins by regretting that two previous appeals for subscriptions had remained unheeded. He goes on to apologize for the smallness of the business connection which is made the excuse for the appeal, and "expresses the hope "that he will shortly be able to send more orders." The last sentence exposes the true inwardness of the trick.

The topic that arouses the "Ironmonger's" scorn is mentioned here because we have only too good reason to believe that it is a kind of trade canker which is to be found in a very bad form in certain departments of the gas industry. The lower staff of the distributing branch of a gas undertaking have always been a source of anxiety to their official superiors. The "gas men" who are brought into contact with publicans, managers of places of public entertainment, and so forth, are peculiarly exposed to temptations which need not be particularized. Nowadays the distributing staff have dealings with many more people, and with representatives of more various interests, than ever. Here, again, it is unnecessary to particularize; but it is certain that many a manufacturer's agent could tell some rather strange tales of invitations to join "gas men" in their outings, and of the consequences as regards his pocket. The evil will go on so long as the mutual jealousies of rival traders induce them to submit to this kind of blackmail, for fear of offending a class of small officials who are much more influential than their superiors always realize. It is nevertheless a scandal which these superiors should deal with, for their own credit's sake. If the next trader to be victimized in this way were to send evidence of the fact to the Directors of the Gas Company concerned, which might be done without unnecessarily exposing the source of the information, some remedial action might be taken. The old revolutionary principle applies here: "Who would be free, themselves must strike "the blow!" for it is hopeless to expect gas directors or even high officers to know to what practices the subordinate staff are addicted in secret.

Smokeless Fuel Wanted.

A MAGNIFICENT example of journalists' wisdom, which often exceeds that of the average Coroner's jury, may be found in some recent utterances of the "Daily News" in regard to the fining of a London Water Company for emitting black smoke from the chimneys of their pumping-station. The Welsh colliers' strike has produced many curious consequential results; and among the most troublesome of these is the demonstration that the comparative absence of black smoke from London factory chimneys has been mainly due to the nature of the fuel consumed, and not to the character of the means employed for burning it. Smoke abatement has been a "cause" in London for many years; and the smokelessness of most Metropolitan industrial chimneys has been taken as a proof that the laws against smoke emission are much better administered in the capital than in such neglected places as Manchester. It has been roundly asserted that where the Local Authorities of the northern towns have failed to prevent the emission of dense smoke from factory chimneys, the true reason has been the presence of the offending manufacturers in such authorities and upon the local Bench. London has supplied an answer to this reproach. The experience of the past few months has proved that London factory owners simply avoided producing smoke by burning smokeless Welsh coal so long as they could get it. It was the same with the Railway Companies and others. When the supply of smokeless coal failed, there was nothing for it but burning something else; and then the police and the magistrates began to be busy, while the atmosphere of some parts of the Metropolis assumed an appearance and consistency reminiscent of Stockport. Lastly, the Water Companies fell just like the others. Their boiler furnaces were only adapted to deal smokelessly with a particular kind of fuel; and when this could no longer be had, the law of smoke prevention was broken under the stress of the greater law that the pumping of water for the proper supply of the town must go on. Nevertheless, the offenders were fined; and the newspaper comment was that "the probable effect of the Welsh "strike, if it lasts long enough, will be to deprive Wales of "its monopoly by stimulating invention for the production of "smokeless coal." How would one set about inventing a particular kind of "coal"? It is not very creditable, perhaps, to the mechanical engineering of the age that the failure of the Welsh smokeless coal supply to London and the South of England should have exposed the backwardness of the practice of smoke prevention in respect of steam-boiler furnaces; but the fact is worth noticing for all that it implies.

Artificial Albumen.

IT will not be wise to attach too much importance to the report, which went "the round of the papers" last week, to the effect that Dr. Lilienfeld, of Vienna, has succeeded in producing artificial albumen, the basis of animal food, from certain coal-tar derivatives. The demonstration seems to have been conclusive as to the fact; for Dr. Lilienfeld is reported to have performed it before a congress of chemists. The process is described vaguely as consisting in "the "condensation of phenol and amydo-acetic acid with "phosphoro-chloric oxide," which produces "pepton;" and this hitherto exclusively animal product somehow comes out at last as albumen, not to be distinguished by any test from the natural article. There is nothing impossible about this. Other products ordinarily resulting from vegetable and animal life-processes have been artificially made from coal-tar derivatives; and why not albumen? It is probably only a question of degree. All the same, we are as yet far from realizing the newspaper prognostication that we are all to "have on the breakfast-"table a cruet containing phosphoro-chloric oxide, with "which we shall make our own eggs." The suggestion that "eggs for political purposes will be manufactured "with a deliberate deficiency of chloric oxide," is only an indication of how soon man's natural depravity affects the products of his intellectual forces. We shall have to wait some time for these fruits of chemical industry.

Gas Traction for Tramways.—The Neath and District Tramways have been acquired by the Corporation of Neath, and extended 4½ miles; and at a recent Local Government Board inquiry in regard to an application for sanction to borrow £15,000 for gas-works purposes, it was stated that the lines would henceforth be worked by gas traction.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 330.)

LAST week was a rather disappointing one on the Stock Exchange. Upon the re-opening on Tuesday, although the attendance was small and business was quiet, the general tendency was firm. Aided by the improving prospects of an early pacification in the western world, things took quite a cheerful turn, when suddenly a disturbing factor arose in the East, and the intelligence received from China threw things completely back again. Consols were sensitive, and had a smart drop. In special lines, Rails were depressed by low dividend announcements; but Americans, of course, were buoyant. The Money Market is as easy as possible; short money being overabundant, and discount rates having slipped down appreciably. Business in the Gas Market was decidedly quiet; and it looks as if the usual autumnal torpor has fairly set in. Movements in price were few in number and slight in degree; and they were irregular too—there being about as many in the one direction as in the other. The general tendency, however, appears to be fairly firm. In Gaslights, the "A" was put down a couple of points on the opening day by way of marking the fall in the dividend. But this level was steadily maintained through the week; and transactions were made daily at 298½. The secured issues were firm and quiet. In South Metropolitan, business was decidedly limited. But the stock was strong, aided by the favourable report and accounts issued; and it rose a point. The rate of dividend will be raised from £5 5s. to £5 6s. 8d. per cent.; the latter being a more conveniently calculable figure. Some business was done in Commercials, at rather better prices; but the quotations did not move. The Suburban and Provincial Companies were all very quiet and steady. The accounts recently to hand continue to show that, as a class, they have done well in the half year. The Continental Companies were just as quiet as the rest, and ruled firm generally; while Union had a further slight advance. None of the minor undertakings presented any feature calling for notice. Business in the Water Companies was remarkable for being almost entirely confined to secured issues. The tendency was good; and a few advances in quotation were scored. The Kent Company meet to-morrow, and will declare a higher dividend.

The daily operations were: Business in Gas was quiet enough on the opening day, Tuesday; but it fell calmer still later on. Gaslight "A" receded 2. Wednesday was very slack indeed; but prices were good for the most part. South Metropolitan gained 1. Thursday was even quieter; and no changes in Gas prices were effected. But in Water, Southwark ordinary rose 3; ditto "D," 2; and Grand Junction debenture, 2. Friday brought a little more activity into the market; and prices were good. Continental Union preference rose 2; but Newcastle debenture fell 2½. Saturday was quite devoid of feature; and quotations closed unchanged.

ELECTRIC LIGHTING MEMORANDA.

New Electrical Schemes and the Financial Press—A Primary Battery Scheme—Nature of the Cell—Criticisms.

RECENT revelations of some of the tricks of company promoting are having a noticeable, though it may be transient, effect upon the conduct of the financial Press with regard to new ventures. There may or may not be honest and independent daily financial newspapers. We are not called upon to decide so nice a question; but it is amusing just now to observe the gingerly way in which these publications handle projected schemes, electrical and otherwise. Their conductors are well aware that what are put forward in their editorial columns as opinions of the soundness of new company issues are thoroughly "suspect." It does not matter whether these opinions are good, bad, or indifferent, the suspicion of venality clings to them still. If favourable, the supposition is that they are bought by the promoters; if bad, that the paper has not been "squared." Mere indifference signifies nothing either way. The difficulty with this section of the Press is that it cannot afford to be indifferent to the character of the speculations that are offered to the public day by day, any more than a political journal can live outside politics, or a technical periodical be consistently ignorant of its chosen technic. Regular operators may buy the paper for the sake of the market news; but this is not a sufficient reason for the existence of a fully-equipped journal. Consequently, one notices, nothwithstanding the circumstance of the financial Press being actually under a blacker cloud than ordinary, that it ventures to put forth a timid opinion or two respecting the character of new companies.

One such expression of opinion, respecting a "Syndicate" formed to introduce a primary battery for the generation of electricity for lighting and small power purposes, lately attracted our attention by reason of the modesty of its phraseology. Nothing could be meeker than the way in which the merits of this battery were descanted upon. Not so very long ago, any financial newspaper engaged in the puffing of an electric lighting

project would have gone against gas with a lurid display of abusive adjectives, and declared that anybody who ventured to doubt the transcendant merits of the new speciality would deserve to be consigned to an asylum for idiots. Now it is merely suggested that, if the reports of the expert gentlemen who have tested the new battery are to be relied upon, there may be something in it. True, electricity thus generated must always be dearer than that obtainable from a steam or gas-driven dynamo; but cost is not everything, when requirements are small. It has always been recognized that the primary battery is a handy source of electrical energy, up to a point; and it is at least conceivable that invention might succeed in enlarging the scope of this class of electrical apparatus. Wherefore, why not give a second thought to the proposals of the New Electricity Supply Syndicate, formed to exploit a system of supplying electricity without machinery.

It is hardly surprising that this old familiar strain should be heard once more. It is some time since a new primary battery was placed upon the market; and history was due to repeat itself. The promised "Revolution in Electricity" attaches itself to what is styled the "Rowbotham Primary Generator;" and our contemporary the "Electrical Review" promptly condemns the whole thing to "the fate of every other enterprise of the kind—namely, complete failure." As we may have inquiries on the subject, it will save time and trouble to give a general description of the "generator," which consists of a series of galvanic cells mounted on an inclined plane, in order that the electrolyte may flow from one to the other by gravity. The elements of the cell are carbon and iron; the former not being consumable, while the latter is used up in proportion to the energy drawn from the system. There is no novelty here, either of arrangement or of material. "The use of iron as the positive element is pretty ancient history. Blanch Brain, and especially the notorious D'Humy, and others, tried iron; but we hear nothing of their batteries now." Similarly, the system of circulating the electrolyte has been tried over and over again; and every conceivable blend of fluid has been used for this purpose. Yet the use of galvanic batteries for electric lighting has never been a success, for the reasons that the plan is extravagantly costly, and that the efficiency of such generators rapidly falls in use.

Professor S. P. Thompson and Mr. Haydn T. Harrison have vouched for the fact that, having regard to the cost of the raw materials consumed, the Rowbotham battery will supply electricity for about 5d. per unit. Our contemporary asks pertinently, for how long? And what is included in this estimate of cost, for comparison with a steam or gas-driven dynamo plant? Seriously, it is asked how experts can, in the present year of grace, issue such reports as that in question. It is but fair to record the curious fact that the other leading English electrical journal, the "Electrician," does not think the case of primary batteries so hopeless, nor this particular example so bad. Indeed, it professes to see in the Rowbotham cell "in many respects the essential elements of commercial success." Yet it is far from conceding that this generator is everything that could be desired. We are disposed to agree with this authority that the success of the "new" battery will not depend upon whether it can generate electricity for 6d. or 1s. 6d. per unit; but wholly upon "whether it can be installed and used continually without inconvenience from frequent need of repairs, or the annoyance due to bad smells and a voltage that asymptotically [good word!] approaches zero. Not the brief tests of experts; but the test of time and actual practical use will settle such points as these." But should they not have been settled before the cell was put upon the market?

THE ACETYLENE EXHIBITS AT THE IMPERIAL INSTITUTE.

(*Continued from p. 252.*)

THE Sunlight Gas Company, Limited, are the owners of Mr. R. Goodwin's patent, No. 17,644, of 1896, for the "Production of Acetylene and Carbonic Acid Gas Combined." The apparatus made by the Company resembles, in essential points, that illustrated and described in the abstract of Goodwin's specification in our "Register of Patents," Vol. LXIX., p. 655. Briefly Goodwin's system as carried out by the Sunlight Gas Company, Limited, consists in decomposing a mixture of calcium carbide and calcium carbonate in suitable proportions by means of water acidulated with sulphuric acid. The gas evolved is purified by means of copper sulphate. The calcium carbonate is added to the carbide in order that the gas may consist of a mixture of acetylene and carbonic acid in place of acetylene alone. What advantages does such a mixture possess over simple acetylene, and are its advantages discounted by any serious disadvantages?

It is comparatively ancient knowledge that a luminous gas flame may be disillumined by the addition to the gas of a certain amount of carbonic acid. Professor Vivian B. Lewes has shown that 1·26 volumes of carbonic acid are required to disillumine the flame from one volume of 16·3-candle coal-gas; while 2·29 and 3·12 volumes of carbonic acid are required per volume of 24-candle and 43-candle oil gas respectively. With these rich gases, the carbonic acid is a far more potent disilluminating agent than is air; for the volumes of air required to render the gas flames non-luminous are more than double those of carbonic acid. Carbonic acid is, indeed, the most potent disilluminant of all the common inert gases, probably in virtue of its high specific heat. The temperature of a gas-flame disillumined by carbonic acid is lower than that of the luminous flame or one disillumined by air. The presence of an inert gas in coal gas also retards the separation of carbon in the flame; and the temperature required for the decomposition of acetylene is directly raised by the presence of a gas such as carbonic acid. From observations such as those which Professor Lewes placed on record in 1892,* we may infer that carbonic acid has a disilluminating action on the flames of hydrocarbon gases, not because it aids the combustion of the gas, but because it lowers the temperature of the flame. Reduction of flame temperature implies waste of energy, and therefore the addition of carbonic acid to an illuminating gas is attended with a falling away from its maximum illuminating duty. The store of energy in the gas is partially frittered away in low-degree heat, instead of being as far as possible given out in luminous radiation.

A report on Mr. Goodwin's system for the production and use of a mixture of carbonic acid and acetylene by Professor J. Emerson Reynolds, D.Sc., F.R.S., states that the best effects are obtained when the proportion of carbonic acid is from 5·8 to 8·5 volumes per cent. This proportion suffices to produce a mixture which gives a white and smokeless flame under conditions under which acetylene would smoke freely. The mixture therefore has a great practical advantage over acetylene; but at what cost is the advantage gained? On this point Professor Emerson Reynolds gives no precise information. He says that the photometric value of the plain acetylene flame is 15 to 16 times that afforded by the same volume of Dublin coal gas; but he does not say or show that this photometric value is preserved when the acetylene is mixed with carbonic acid. In the absence of direct evidence to the contrary, we are prepared to maintain that the illuminating value of acetylene is lowered by an admixture of carbonic acid; and that the smokelessness of the flame from the mixture is secured by taking some steps in the direction of disillumination of the flame. The percentage of carbonic acid, though small, must lower the temperature of the flame below that of plain acetylene, and hence must reduce the capacity of the flame to emit luminous radiations. The waste may be small, but undoubtedly there is waste of a part of the illuminating value of the acetylene. As a makeshift until we have learnt to burn acetylene to full advantage, Goodwin's process for mixing carbonic acid with the gas may prove useful; but it must not be forgotten that the principle of the process is scientifically faulty.

We have not ventured to challenge Professor Emerson Reynolds's views without giving the subject due consideration. But his report is strangely free from actual data, and we cannot accept mere opinions—even though they be those of acknowledged authorities—when they run counter to the results of numerous observations in analogous cases, unless the opinions are backed by a sufficiency of experimental evidence. Such evidence is lacking in the report of Professor Reynolds. We know that carbonic acid acts as a more powerful disilluminating agent than nitrogen on the flames of coal gas, oil gas, and ethylene; and M. Hubou† has used nitrogen as a diluent of acetylene and found that he sacrificed much of the illuminating value of the gas by the dilution. Are the relative disilluminating capacities of nitrogen and carbonic acid towards other illuminating gases not preserved when acetylene is the illuminating gas to which they are added? We shall be surprised to see proofs that these diluents behave differently towards acetylene than towards other rich gases.

Professor Emerson Reynolds, indeed, in one sentence of his report, offers what may perhaps pass as an explanation of the supposed beneficial action of the carbonic acid on the acetylene flame. He says: "The well-known oxydizing effect of carbonic acid gas on carbon and hydrocarbons at high temperatures sufficiently explains this specific, though necessarily limited, action of carbonic acid in facilitating the chemical changes in progress within the flame of a gas so rich in carbon as acetylene; otherwise its action would be that of a mere diluent like nitrogen." But if carbonic acid oxidizes it suffers reduction; and the heat necessary to reduce it must be taken from the flame. The heat is no doubt restored again when the carbonic acid is re-formed; but there is no gain of energy by the changes. A transference of heat from one part of the flame to another may occur through the reduction and subsequent oxidation of the carbonic acid; but we know no facts which prove the occurrence of the phenomenon. Moreover, in the case of other illuminating gases, carbonic acid *does act as a mere diluent like nitrogen;* and we know no reason why Professor Emerson Reynolds should imply that it acts differently in the case of acetylene.

The apparatus in which the Sunlight Gas Company, Limited, generate the mixture of acetylene and carbonic acid is a simple non-automatic generator provided with a gasholder capable of receiving double the volume of the gas which is evolved from a single charge. If the apparatus were used for the generation of plain acetylene gas from carbide and water, it would strike the critic as a serviceable machine free from those devices of the too-

* "Journal of the Chemical Society," Vol. LXI., p. 337.

† "Le Génie Civil," March 7, 1897, p. 156.

ingenious inventor which fail because they attempt too much. The use of acidulated water is necessary for the production of carbonic acid from the carbonate; but on the other hand, acidulated water is apt to liberate the highly objectionable impurity siliciuretted hydrogen if the carbide to which it is added is not of an exceptionally high degree of purity. On the other hand, the use of acidulated water ensures the gas produced being free from ammonia. There is no doubt, however, that it is better to employ simple water for the generation of acetylene unless some very substantial advantage is secured by the use of a specially prepared solution or liquid.

Readers of the "JOURNAL" are already familiar with the acetylene generators made by Messrs. Read Holliday and Sons, Limited, through the descriptions given by Mr. T. Glover in the paper on "Acetylene Gas" which he read before this year's meeting of the Midland Association of Gas Managers.* To those descriptions we have little to add. It need scarcely be said that a firm having the command of ample resources and employing many expert chemists have succeeded in making sound and simple apparatus which answers its purpose well, even though it may not satisfy the aspirations of idealists. A glance at Mr. Glover's paper will show that the carbide is in excess in the generator, a plan which theoretically is less commendable than the converse arrangement. But very few generators in which the water is in excess are shown at the Exhibition; and the difficulties in the way of making automatic appliances of this class seem well nigh insuperable. It is not surprising, therefore, to find that Messrs. Read Holliday and Sons have here adopted the commoner plan of keeping the carbide in excess at the point of action. The firm make both automatic and non-automatic generators, and also a number of accessories for the use of photographers, cyclists, plumbers, and others wishing to use acetylene in the pursuit of their work or recreation.

A pamphlet of 48 pages issued by Messrs. Read Holliday and Sons is a brilliant exception to the prevalent low-grade trade circulars which are offered to the public by many exhibitors. If it occasionally seems to us to take too favourable a view of the qualities and uses of acetylene, we must admit that there is no instance in it of that gross exaggeration and even misrepresentation which we have lamented in other cases. The general account of calcium carbide and acetylene is evidently written by one of the many capable chemists employed by the firm, for the statements are those of a man trained to observe and to report his observations truthfully. In this they differ from the random outpourings of the professional pamphleteer, who ranks effect higher than truth, and has a profound conviction that abuse of a rival is a sure means of ousting it from public favour. Messrs. Read Holliday and Sons' exhibit is well worthy of them in every way. Two pendants in the Intermediate Gallery of the Institute are supplied with acetylene from one of their generators, which nominally is intended to feed a hundred burners.

(To be continued.)

* See "JOURNAL," Vol. LXXI., p. 464.

ANOTHER VIEW OF LIGHTS AND LIGHTING.

AFTER what has so often been advanced in the "JOURNAL" respecting the hopelessly inartistic way in which electricians are in the habit of treating their lamps when used for the lighting of interiors, and after all our complaints of the indifference of architects to the decorative side of domestic lighting, it is refreshing to discover that during the present year this subject has been brought before the members of the Architectural Association and discussed by them. Mr. Tom Ekin undertook, as an engineer, to state the problem of the application of electric lighting to architecture; and he did it very well, from his own standpoint. We should not have thought it necessary to consider his paper at length, but for the fact that much of what he had to say concerning the placing of lights and so forth applies as much to gas as to electric lamps. Besides, in putting in his plea for electric lighting, Mr. Ekin had things to say about gas lighting which should not be allowed to pass unchallenged.

Naturally, as an electrical engineer, Mr. Ekin assumed the position that in this year of grace it is altogether unnecessary for anybody to dwell upon "the manifold and very apparent advantage of electric lighting over every other known form of illuminant, whether it be considered from a hygienic, artistic, decorative, or even commercial point of view." He went on to declare that "there are very few individuals—excepting, of course, those interested in gas or oil companies—who will not honestly endorse this statement." Mr. Ekin is justly entitled to raise the chant of there being "nothing like leather;" and this is, in point of fact, all that the praise of electric lighting to-day by an electrical engineer really means. When will gentlemen of this persuasion learn that to impute motives of trade interest to their opponents only evokes the obvious retort? It appears to be yet more vain to inquire when they will take serious note of the fact that it is the public who consume gas and lamp oil in ever-increasing quantities, not the vendors of these necessaries of life. It would be impossible for gas engineers and lamp makers to live, if the public really agreed with the electricians with regard to the supremacy of the means of lighting provided by the latter. We interpose this observation here in order to justify the remark which Mr. Ekin's enthusiasm evokes, that both electricians and architects may make up their minds to endure the rivalry of gas and oil for an indefinite time to come.

To pass on, however, to the paper. Mr. Ekin deals first of all with the distribution of lights, and leads off with a statement of the incontestable principle that every "room or space which it is intended to light should be considered and examined from at least three different points of view—viz.: (1) The purpose for which it is to be used; (2) the decorations, furniture, and general surroundings; and (3) the cost of the proposed lighting." Which of these three points is the most important is granted to be a matter of opinion; but the author thinks it may be safely assumed that the third, or question of cost, is not the least consideration. This admission does not lead him to the further confession that the point of expense is the weakest in the whole argument for electric lighting, but merely to the observation that "the skill of the architect or engineer in arranging a system of lighting is in no case more marked or apparent than in getting the maximum lighting effect at minimum cost." Mr. Ekin observes that it is possible to treat the practical problems of electric lighting with a freer hand, and to better effect, in the case of a new building than in that of houses where gas is already installed, because one is so very apt to take the positions at present held or assigned to gas as those most suitable for electric lamps—quite forgetting the fact that gas is so non-adaptable and lends itself with such ill-grace to artistic effect that there are only certain positions in any room in which it can safely be placed." This is a loud-sounding generality which, while not without a certain amount of justification, is not to be trusted too far.

We get the electric lamp ranged alongside the gas-burner again in the admission of the author that shaded lights are the most perfect form of illuminant. It has taken the electricians a long time to bring themselves to endure this sacrifice of the illuminating power which costs so dear. But Mr. Ekin admits the necessity of screening lamps from the eye, though "double or even treble the amount of energy has to be used." How thoroughly does this sensible admission upset all the familiar comparisons of illuminating effect based on the nominal rating of lamps in candle power!

Mr. Ekin is no half-and-half temporizer with this important consideration. He gives up the arc light as not being, and never to be, suitable in any way for the internal lighting of buildings. Even apart from the arc lamp, however, he agrees that electric lights are apt to "glare;" and he contends that this is not one of the inherent faults of the system, but is a fault of the "brain of the stupid person who put it there." The reflection is not quite clear; but the author proceeds to explain that what he means is that every lamp should be used to diffuse light without itself being seen. He is fully aware that "the cost of complying with this requirement is in many cases too heavy to allow of its being adopted." But still he thinks that every electric lamp should be shaded in some way or another. Coming to the amount of light to be provided in particular cases, Mr. Ekin throws over the scientific method of solving such problems according to rule, declaring that a good deal of practical experience and judgment is required for the determination of the proper amount of light required, and also the position in which the lamps should be placed. No photometry for him! He admits the existence of rules for lighting in "pocket-books and similar literature," but is bold enough to avow that he never found these to be of the slightest value. The rules to him have been, if anything, "rather misleading." He denies that it is of the smallest use for anyone to know that a 16-candle power lamp will light a certain number of square feet of floor when raised a given height above it, for the reason that it is quite impossible to take into calculation, or make due allowance for, the surrounding colouring of walls or furniture. One has only to bear in mind the difference of lighting effect producible (say) in a clothier's warehouse compared with a white-tiled dairy, by one and the same light, to feel the force of this criticism.

Mr. Ekin again falls into line with the despised gas lighting practitioners when he condemns the artless electricians' device of lighting an interior by dropping a number of pendant lamps from the ceiling. Nothing is easier to do; and if the lighting points are kept a certain distance from the floor, in this way it is possible to procure a maximum amount of light with a minimum number of lamps and cost. But the effect is thoroughly and incurably bad and depressing. The photometry may be excellent; but the decoration is simply non-existent. Wherefore Mr. Ekin concludes "that the most pleasant, and at the same time most artistic method of lighting ordinary living-rooms is by means of wall brackets, standard lamps, and table lamps—the lamp in each case being shaded so as not to come in direct contact with the eye." But is not this precisely how those older schemes of interior lighting are ordered, which the author had previously condemned as not necessarily prefiguring the means of properly employing electric light? What can electric lamps do in this way that is not already done by gas and oil?

In the discussion that followed the reading of the paper, Mr. G. H. Fellowes-Prynne remarked that in the lighting of public halls it is well, but not all-sufficient, to keep the lights above the heads of the audience. "In that room they had an illustration of placing the lights above their heads, with the most glaring and unsatisfactory result. The lights looked like red-hot hairpins; and they fixed themselves on the retina of the eye." The

speaker did not like brackets and shaded lamps. "If they could hide the lights in the ceiling, or at some given points, he thought that the most satisfactory results could be obtained." Patchy lighting was to be avoided, as it distorted the architectural appearance of a room. Other speakers condemned the lighting of the room in which the meeting was held, which is sufficient testimony that the evil of bad lighting effect is not to be overcome by the simple expedient of adopting electric lamps. The popular electricians' view of the subject seems to be that there is no bad electric lighting; but that some electric lighting is better than others, while every other light is objectionable.

It is possible to agree with the aspiration of the Chairman of this meeting of architects—that some architect of experience would handle the whole subject from the professional standpoint. It should be clearly understood, however, that there is no special science or art of electric lighting, as distinguished from other systems of artificial lighting. The nature of the work to be done, and of the effect to be secured, is one and the same, whatever the means employed. This truth hardly needs proof; but if corroboration is desirable, it may be found in the neighbouring field of artificial illumination for decorative purposes pure and simple. Illumination, in this special sense of the word, is not lighting. But it is worth while to trace the history of the kind of illumination in which what are known as "Vauxhall" lamps are used. Originally, these were little cups of variously coloured glass, containing some oil in which a lighted wick floated. At the period of the latest South Kensington Exhibitions, these lamps were superseded by incandescent electric lamps, worked at an enormous expense. So far from this application of electricity having increased and developed, it has of late years been wholly abandoned; and the "Vauxhall" illuminations of the Earl's Court Exhibitions, which are commercial speculations, are now gas lights. The "moral" of this story is that oil, electricity, or gas are all one when it comes to be a question of effect; while the determining cause of the selection of one in preference to another must be sought in something besides the nature of the illuminant. "Grounds Illuminated by Electricity" would be no attraction nowadays, irrespective of the quality of the illumination. So in this, as in other uses of artificial lights, we get down to the bottom facts, which are the considerations of convenience, efficiency, and cost; and by these must all systems be finally judged. There is no need to fear for gas when the comparison is made between it and electric lighting in any of its forms.

OBITUARY.

The death is announced, by drowning in the Clyde, near Renfrew, of Mr. EDWARD BROOKE, who formerly owned extensive pottery and fire-clay works at Fieldhouse, which some years ago were amalgamated with other similar businesses into the Leeds Fire-Clay Company, Limited, of which deceased was a Director. Mr. Brooke was a man of considerable wealth.

The death last Wednesday, at the age of 73, of M. CHARLES GARNIER, the architect of the Opera House in Paris, calls for notice here from the fact that the lighting arrangements in connection with this magnificent building were described and illustrated in the "JOURNAL" in April, 1875. M. Garnier's design was selected out of 170 sent in in competiton for the prize; and the work occupied fifteen years of his life. According to "The Times," he "installed himself in a kind of shed, and there, during the erection of the building, covered 30,000 foolscap sheets with his plans."

A remarkable man passed away at Halifax last Wednesday morning. We refer to Mr. EDMUND MINSON WAVELL, who was the oldest practising solicitor in England, having arrived within a few weeks of the completion of his 91st year. From 1847 to 1864, he filled the office of Town Clerk of Halifax; and during that period he took a very prominent part in the negotiations and agitation which resulted in the local gas-works passing into the possession of the Corporation. It was in 1855 that the Municipality made overtures to the Gas Company with a view to acquiring their undertaking; but the Company asked a price that was regarded by the Council as prohibitive. The Town Clerk thereupon promoted a rival Company, called the Gas Consumers' Company; most of the shares being taken up by members of the Town Council and other leading men in the town. The popularity and determination of the leaders of this movement were such that the proprietors of the existing gas-works took alarm, and promptly offered their concern to the Corporation at a much lower price than they originally required. The offer was accepted; and the business acquired formed the nucleus of the present extensive and profitable gas-works.

PERSONAL.

Mr. HENRY PEEKS, who has managed the Thorne Gas-Works for 45 years, has lately retired. In consideration of his faithful services, the Company have voted him a pension.

A meeting of the Lincoln City Council in Committee last Friday decided to recommend the appointment of Mr. J. H. TEAGUE to the Water-Works Engineership, which post was held by his late father. There were several candidates.

Mr. H. MONCKTON, the Town Clerk of Maidstone, has resigned his seat on the Board of the local Water Company. The proposal of the Corporation to purchase the water-works rendered the two offices incompatible and the retention of both undesirable. At the same time, the knowledge which Mr. Monckton has gained as a Director of the Company will be of material assistance to him in directing the Council in the work which they have before them.

Mr. JOHN RICHMOND, of Dunbar, has been appointed Resident Manager of the Kilkenny Gas-Works, in succession to the late Mr. Catlin, deceased. Mr. Richmond was trained under his father in the works of the Whitburn Gas Company, West Lothian; and before he was seventeen years of age he was appointed Manager of the works—a position which he held for seven years. He was appointed Manager of the Dunbar Gas-Works in January, 1895, and during the 3½ years he has held office there the financial position of the undertaking was greatly improved, and the price of gas reduced 1s. 3d. per 1000 cubic feet in two years. The Gas Commissioners of Dunbar, being anxious to retain Mr. Richmond's services, offered to increase his salary by £20 per annum; and this offer being refused, they have voted him an honorarium of £10.

The Metropolitan Gas Inquiry.—The Select Committee appointed by the House of Commons to investigate the question of the charges of the Metropolitan Gas Companies held their first sitting last Thursday, "to choose a Chairman and consider the course of proceeding." The constitution of the Committee has already been notified (*ante*, p. 248). Sir John Dorington (Tewkesbury) was chosen Chairman; but it is understood the Committee will not do anything this session beyond recommending their re-appointment, with a view to the prosecution of the inquiry next year.

The Centenary Edition of "Newbigging's Handbook."—The sixth (and centenary) edition of Mr. Newbigging's "Handbook for Gas Engineers and Managers," which has been for some time in preparation, will be ready for delivery this week. In order to keep the work abreast of the constant advances that are being made in the gas industry, much of the text has been re-written, and it is illustrated by about fifty additional diagrams. A steel-plate portrait of William Murdoch forms a suitable frontispiece to the volume, which will be issued in two styles of binding. A synopsis of the contents of the "Handbook" will be found in the advertisement which appears elsewhere.

Water Gas in Spain.—According to the "Revista Minera," there is a good prospect for water gas in Spain. Owing to the abundance and cheapness of anthracite, it is said to be possible to manufacture water gas by the Strache process at a cost of 1½c. per cubic metre (about 4d. per 1000 cubic feet), or even less. The expense of distribution is reckoned at something under 3c. per cubic metre; so that if it were sold at 8c. it would yield a good profit on the capital employed. Used with the incandescent gas system, it would, at this figure, give a light of 16 candles for five hours at a cost of 4c. For motive power, 28 cubic feet of water gas, used in improved gas-engines, will give 1-horse power. It is estimated that works could be built in Madrid for 250,000 pesetas (£10,000).

Salt Water for Street Sprinkling.—This subject has lately been investigated by the Merchants' Association of San Francisco, which had a portion of a street sprinkled with sea water and the remainder with fresh water. The following conclusions were reached, according to the "City Record" of Boston: "It binds the dirt together between the paving-stones, so that when dry there is no loose dust to be raised by the wind. It does not dry so quickly as fresh water; and it is claimed in those cities which use salt water that one load of it is equal to three loads of fresh water. The salt water which is deposited on the street absorbs moisture from the air during the night, so that in the early morning the street is thoroughly moist, and has the appearance of having been freshly sprinkled. This effectually prevents dust being raised by the wind or street sweepers before the regular sprinkling-carts can get over the ground during the morning, and thus overcomes one of the great nuisances."

The Reproductive Undertakings of Municipal Corporations.—The return on the above subject moved for by Sir H. Fowler, to which reference was made last week, has been ordered. It will furnish the following particulars: Capital.—(1) Name of undertaking, and date when corporation commenced working. (2) Total capital, inclusive of borrowed capital, provided by corporation. (3) Amount of capital borrowed. (4) Amount of capital borrowed which has been paid off. (5) Balance of capital borrowed which was outstanding at March 31, 1898. (6) Amount in sinking fund or loans fund at March 31, 1898, in respect of capital borrowed. Income.—(7) Average annual income for the five years ended March 31, 1898; or, if the undertaking commenced during that period, from date of commencement. (8) Average annual working expenses for the period mentioned in column 7. (9) Average annual net profit for the same period. (10) Average annual amount paid during the same period in respect of principal and interest on capital borrowed. (11) Average annual amount set apart for depreciation. (12) Mode in which average annual net profit has been applied.

NOTES.

The Substitution of Exhaust Fans for Chimneys.

It is only to be expected that manufacturers of specialities in engineering plant should endeavour to exploit them for all they are worth. Accordingly, it is not surprising that information should be circulated respecting the success which has rewarded the efforts of the B. F. Sturtevant Company, of Boston, in the direction of superseding chimney draught by one of their large fans. It is reported in the "Engineering Record" that the Sturtevant Company had occasion to change the situation of the boiler plant at their works, and took the opportunity of discarding the chimney which had previously furnished the necessary draught. The bricks from the old chimney were utilized in the erection of the new boiler-house, which has no chimney-shaft properly so called. The waste gases from the 300-horse power boilers are exhausted by a fan having a 54-inch wheel, and are discharged by means of a short delivery stack which is hardly noticeable from the outside. The fan is driven by a direct connected upright engine, so regulated that the speed increases as the steam pressure falls; thus maintaining a practically constant pressure in the boilers. As the result, a mixture of coal and yard screenings is burnt smokelessly, without carbonic oxide in the waste gases, tested by the Orsat apparatus. The boiler efficiency was 11·05 lbs. of water evaporated into dry steam per pound of fuel, burnt at the rate of 16·45 lbs. per square foot of grate. This performance is held to show that the chimney is superseded as a draught producer for boiler furnaces by the fan, and only remains serviceable as a means of discharging the products of combustion into the atmosphere at a convenient and harmless height.

The Balancing of Machinery.

In a paper read before the Manchester Association of Engineers, on the "Balancing of Engines," Mr. James Whitcher discussed the question of vibrations set up by moving machinery. Mr. James Swinburne read a paper before the British Association last year, in which he answered affirmatively the question whether reciprocating machinery should be mounted on springs. This conclusion was opposed by Mr. Whitcher, on practical and theoretical grounds. He now contends that his practical objections were just; but he admits that his theory was wrong, and requires correction. This brings up the case where a resilient sub-basis for engine foundations is indicated. The most promising procedure for isolating the vibrations of unbalanced engines from surrounding property, according to this author, is to make the foundations as heavy and solid as possible, and see that they are carried on a deep sub-bed of faggots or the like. Then if the sub-bed is well drained, the trouble ought to be prevented; but if the foundations become water-logged, the very means taken to prevent the transmission of vibration may conduce to this effect. The perplexing circumstance of these vibration nuisances sometimes is that, in the aggregate, an immense mass of material is being appreciably vibrated by an originating cause apparently small. The explanation is that the transmission is by wave motion. A complete system of waves is a balanced mechanism in itself, since the sum of the moments having regard to the direction is *nil*. For this reason, where the circumstances favour wave transmission, vibration may become very troublesome indeed. To effectively balance a reciprocating engine is no easy matter. A common, but futile, device is to put a rotating counterweight on the fly-wheel opposite the crank; but a rotating weight cannot balance a linear reciprocation. The subject is eminently one for further study; and young engineers having access to a model reciprocating motor could hardly employ themselves better than in working out the phenomenon of vibration.

The Rusting of Iron.

The reasons for the rusting of iron and steel are intelligently stated and discussed in a recent issue of the "Ironmonger." It is explained that, chemically speaking, rust is a hydrated oxide of iron containing a small proportion of free metal which causes it to be attracted by the magnet. In other words, it is a compound of iron, oxygen, and water, mixed with some free iron as aforesaid. It is not formed by the direct union of iron with the oxygen of the atmosphere, since in perfectly dry air at ordinary temperatures iron and steel do not rust. The primary cause of the rusting of iron is the presence of carbonic acid in the atmosphere, which acid is carried down by rain or moisture, and deposited on any exposed metallic surface. The first result of this contact is the production of the unstable compound ferrous carbonate, which quickly absorbs more oxygen, and becomes hydrated oxide of iron. This oxide, in its turn, is very hygroscopic; so that when once formed it always holds enough water to carry on the oxidation of the metal beneath. The only ingredient of which a continual supply is afterwards necessary is the oxygen of the atmosphere. Hence, therefore, though three separate reagents are requisite to start the rusting of iron, only one is needed to carry it on; and this is the one which, of all others, is the most difficult to keep at a distance. This explains the remarkable way in which perfectly bright burnished iron and steel surfaces retain their brilliancy for a comparatively long time; and also the equally remarkable speed with which they become covered all over with rust when once it has obtained the smallest lodgment upon them. But chemistry explains more than this. It explains the necessity for the thorough removal or the total absence from iron or steel of rust, before it is painted, if the coating is to be a satisfactory preservative. When applied to a clean surface, paint will be efficient if it succeeds in holding at bay any one of three substances, whose rates of diffusion through the porous paint skin are widely different. On a partly rusted surface, paint must be competent to withstand the entry of oxygen, which is practically impossible. By the law of chemical equivalents, when damp carbonic acid attacks iron, the volume of hydrogen given off is many times greater than that of the metal dissolved; so that if the action goes on under a tough layer of paint, the latter will be raised in large blisters. If the film of paint is so porous as not to be thus blown off the surface of the metal, it must evidently be far too porous to be of any good at all.

COMMUNICATED ARTICLES.

THE PURIFYING OF COAL GAS.

By Stephen Carpenter, of East Ham.

From what has been said about hydrate of lime, it is obvious that lime is indispensable for removing carbonic acid and bisulphide of carbon from the gas. The pernicious effects of these impurities are well known. The carbonic acid deteriorates the illuminating power, and the bisulphide of carbon is not merely useless, but is absolutely noxious, as its presence in the gas gives rise during combustion to sulphurous acid. Bisulphide of carbon is a sulphur acid corresponding to carbonic acid, but containing two elements of sulphur instead of oxygen, and combining with alkaline sulphide to form a species of salts called sulphocarbonates.

If the conditions under which lime acts efficiently upon the sulphur impurity in the forms other than sulphuretted hydrogen were adequately known, the purifying power of the material might be increased by excluding the atmospheric air from the lime purifier, and the quantity of lime as a purifying agent might be reduced by slaking it properly. I may remark that lime which is to be used in gas purification should be slaked three or four days before it is required. It should be properly slaked and well mixed before being used. If this is not properly done, there will be small nodules left which will make the lime worthless. It has been said that lime which is to be employed in gas purification ought not to be slaked until just before it is placed in the purifiers, for slaked lime absorbs carbonic acid from the air, whereby its purifying action is impaired. This I must deny. If the lime is slaked only just before it is put into the purifier, it is not a practical way of using the material, for the reason that part of it will not be properly slaked. There will be small nodules in the lime which has received but very little water—perhaps none at all; and when the material is put into the purifier these will slake, and cause weak places in the layer. The lime ought to stand three or four days after it has been well slaked and mixed before it is put in the purifier; and then it will be in a fit state for removing the bisulphide of carbon from the gas. The object of using lime is to effect the absorption of the bisulphide of carbon, which is acid in its nature, by the alkaline sulphide of calcium. The bisulphide is capable of being absorbed to a very small extent by clean lime, but more readily by the union of lime with sulphuretted hydrogen—what the writer calls hydrogenated sulphide of calcium.

The combination of bisulphide of carbon with sulphide of calcium is slower and more gradual than that of the other impurities in crude gas with the several agents used to absorb them; so that to effect a corresponding degree of purification, the gas requires to be kept in contact with the purifying material for a longer time. It is of great advantage to have lime purifiers of larger area than those for oxide of iron; and to have four layers of material, about 4 inches thick. There will then be four surfaces of lime in each purifier. As the lime takes so many impurities out of the gas, by having four thin layers, these impurities will be more divided. As it is indispensable that the whole of the carbonic acid should be removed before the gas enters the lime purifier containing the sulphide of calcium, by having four layers of lime we shall get this. As carbonic acid has a greater affinity for lime than sulphuretted hydrogen has, it would be confidently expected that the first tray of clean lime will take out carbonic acid in greater proportion than it takes out sulphuretted hydrogen. So that the first tray of lime will be so busy with removing the carbonic acid that a part of the sulphuretted hydrogen will escape to the other layers of lime, and convert them into sulphide of calcium. By inserting a test-cock in the middle of the purifier just above the second tray of lime, and there testing the gas for carbonic acid and bisulphide of carbon, and testing at the outlet of the purifier for these impurities, the manager will be kept well informed as to the state of the lime in the middle and at the outlet of the purifier. It will show how much of the impurities has been taken out of the gas by the first lime purifier. After the material in the first tray has become in a state of carbonate of lime, the second tray will take out the carbonic acid and then the third tray. By this time the lime will be foul enough for the purifier to be shut off. The

manager should then bring the second lime purifier first, and put on a clean lime purifier to be the second.

The employment of lime purifiers in the manner here described, whereby the gas can be purified from bisulphide of carbon and all the carbonic acid, was devised by the writer in 1866 and 1867. He found out the best way of using lime for eliminating the carbonic acid and part of the bisulphide of carbon from the gas, and especially of testing the gas for carbonic acid, and confining this to the first lime purifier, so as to decarbonate the gas before it passed into the second purifier, where part of the bisulphide of carbon would be taken from the gas. Later on he revivified the foul lime before taking it out of the purifier; thus abating the nuisance of the foul lime, and at the same time preparing it for use again for the purification of gas. At one time lime was the only material used for taking out sulphuretted hydrogen and carbonic acid. Nothing was then known about the bisulphide of carbon in the gas. It may be said that, where lime is used, the bisulphide of carbon is sure to be taken out. The writer does not assent to this. He used three lime purifiers in a gas-works in London as long ago as the year 1847, but did not work them in the same way that he did at the Bow works. The tests then were only for sulphuretted hydrogen and carbonic acid. The test for the latter impurity was taken at the outlet of the last purifier; but now the gas has to be tested for it at the first purifier.

It was in the years above named—1866 and 1867—that the writer first saw the importance of, and practically carried into effect, the principle of working two lime purifiers—one for taking out the carbonic acid and a portion of the bisulphide of carbon, and the second for removing two-thirds of the latter impurity. He was well aware that carbonate of lime such as is found in purifiers has little affinity for bisulphide of carbon. It is not so much the carbonic acid in the gas as the atmospheric air that interferes with the chemical action of the lime. The process was tried at the Bow Gas-Works for many years. The writer did not follow the practice of keeping one purifier for taking out the carbonic acid before it entered the second purifier. His method may be termed the "rotation" system—that is to say, when the lime in the first purifier is sufficiently foul, that purifier should be shut off, and the second one put first; a clean one being put on for the second purifier. It is a very great advantage to work two purifiers in the way described, for the reason that the purifier can be ventilated and the lime revivified at the same time. Moreover, nuisance is abated, and the lime can be used a second time. If lime purifiers are worked in such a way (of which the writer does not approve) that the carbonic acid in the gas is eliminated by the lime in the first purifier, and the second one is kept wholly for what is called sulphide of calcium, when the lime in that purifier has become highly saturated with sulphur, it has to be changed.

In this purifier, which is termed the sulphide of calcium purifier, the lime is so heavily charged with sulphur that it will be risky to ventilate it, as there is danger of raising the temperature of the foul lime to such a height as to ignite the grids—a serious consequence. By working two lime purifiers in the manner described, this process of purification will be found not only more convenient, but also more economical than any other in which lime is employed, as a great saving is effected by using the revivified material a second time.

There is no better, cheaper, or cleaner system, if the lime is used in the manner here described, for the removal of all the carbonic acid and part of the bisulphide of carbon from the gas. The writer worked lime purifiers in this way from 1866 to 1896, and obtained good results; and he has placed the results of his experience at the service of students and young gas managers. His advice to them once more is this: Look well after the lime purifiers, and test them twice in 24 hours. There is a chemical action going on between the lime in the purifier and the crude gas which has not been explained; and the writer thinks it never will be. He has tried his utmost to solve the problem, but has not been able to do so farther than he has stated.

Gas as it issues from the retorts contains several impurities—viz., tar, watery vapour, ammonia, carbonic acid, sulphuretted hydrogen, and bisulphide of carbon. Part of the tar and watery vapour is deposited in the hydraulic main; the other impurities being carried forward with the gas as it passes from the outlet of the condenser into the scrubbers. At the inlet of the latter it should be tested with the eudiometer for carbonic acid and sulphuretted hydrogen. The process is as follows: Take a portion of the gas in the eudiometer, add a solution of acetate of lead, and well shake it up. Put the tube in water, and let it remain for two minutes; then read off the absorption, which will give the percentage of sulphuretted hydrogen in the gas. Add a few drops of a strong solution of caustic potash to the gas in the eudiometer, well shake it up with the gas in the tube, and let it rest for two minutes, then read off the absorption, which will give the percentage of carbonic acid in the gas. Test the gas for these impurities in the same way at the outlet of the scrubbers; and the result will show what impurities have been taken out by these appliances. Next test the gas at the same place with red litmus paper, to see if it contains ammonia. If there is any, it will turn the paper blue. The test for carbonic acid is lime water. When testing the foul gas for the impurity named, pass it through a small hand purifier charged with oxide of iron to take out the sulphuretted hydrogen. Take a portion of the lime water, and let the gas bubble through it for three minutes. If the water remains transparent, there is no carbonic acid in the gas; but if it becomes milky, it contains some. To test for sulphuretted hydrogen, use slips of paper moistened with sugar of lead. If there is any sulphuretted hydrogen in the gas, the paper will become a very dark brown.

To make the lime water used for testing gas, take a gallon of water, and drop into it about 4 oz. of quicklime. After this has dissolved, decant the clear fluid, filter it, and put it into a glass bottle, and then it will be ready for use when wanted. To prepare the test-paper for sulphuretted hydrogen, dissolve one part of sugar of lead in eight parts of water, and moisten some sheets of bibulous paper with the solution. Let them dry, cut them into small strips, and put them in a glass bottle. Litmus paper is made by taking a blue solution of litmus, adding a few drops of a very dilute solution of sulphuric acid, and then saturating the paper with the solution to such an extent as will leave it slightly red when dry. Cut into small strips, and put them into a dark glass bottle, and they will be fit for use. If the gas is tested several times a day with these agents, it will keep the manager well informed as to the impurities in his gas. The testing of gas for bisulphide of carbon is fully explained in the writer's pamphlet on "The Purification of Coal Gas." To ensure the purity of gas, it should be tested at the various purifiers at intervals. By this means it is ascertained when it will be necessary to change—or, more properly speaking, to replace—the purifier having the foulest lime for another containing fresh lime.

THE LOCAL GOVERNMENT BOARD AND THE PROTECTION OF WATER SUPPLIES FROM POLLUTION.

By Percy Griffith, Assoc.M.Inst.C.E., F.G.S., M.Inst.M.E.

All those who are interested in water-works will be aware that the Local Government Board recently endeavoured to introduce a series of clauses bearing upon this matter into several Private Bills which were before the Houses of Parliament this session. These clauses are given in full in the Appendix; and I propose to deal with them seriatim, afterwards summing up the actual position of affairs at the present time, and suggesting the lines upon which any further investigation of this important question should in my opinion be carried on. I would, however, suggest here that as the difficulties attending the alteration of the law of water supply are very serious, a Royal Commission should be appointed to investigate the matter in all its bearings, and report upon the most satisfactory basis upon which amendments to the existing law might be carried out. The following suggestions are advanced with the view of pointing out several of the principal considerations which must be borne in mind in dealing with the subject, and also with the object of opening a discussion which cannot fail to assist in the solution of the difficulties.

Penalty for Failure to Supply Pure and Wholesome Water.

The question of the position of a company or local authority convicted of supplying impure water to their consumers is one of vital interest at the present moment, seeing that during the past twelve months serious outbreaks of typhoid fever have broken out in two provincial towns (Maidstone and King's Lynn) with the most lamentable results, traceable in both cases directly to the contamination of the public water supply. The question which at once suggests itself is: What penalty can be inflicted on the purveyors of a necessity of life, such as water, when they are convicted of causing, not only an outbreak of disease, but a serious loss of life? In the case of any other comestible offered to the public for sale, the law provides very definite means of punishing any person or persons found guilty of causing injury to the health of the consumers thereof; but with regard to water, which is an element of public consumption far more essential than any other, it appears that no definite means exist of inflicting any penalty on the offenders whether they be corporations, companies, or private individuals.

It must be granted at the outset that, in the interest of the public health, this state of affairs should not be allowed to continue; but the most practical method of effecting the end in view is not by any means so clear. In my opinion, the clauses which the Local Government Board have attempted to impose upon several private water-works companies during the present session of Parliament are very far from meeting the case, and for several reasons; the following being the most obvious.

Firstly, it is grossly unfair that the imposition of any serious restrictions should take effect only on such companies as may happen from time to time to be before Parliament. As the House of Commons has intimated very clearly, any amendment of the law should be made by means of a Public Bill applying equally to all water companies at one and the same time, and not piecemeal (as was proposed), which would mean the lapse of many years before the restrictions were applied universally.

In the next place, it cannot be fair that penalties for supplying impure water should be inflicted on one class of undertakings, and not on another. Seeing that the works at King's Lynn are in the hands of the Corporation, it is obvious that municipal water-works are quite as liable to pollution as companies' undertakings; and it must be obvious to everyone that no effective protection can be secured to the public at large unless

municipal water-works are subject to the same safeguards as those in the hands of companies.

Another important oversight which is apparent in the clauses proposed by the Local Government Board, is that no definition is given of what "pure and wholesome" water really is. Experts are even now totally at variance as to what is the proper standard of purity in water used for domestic purposes. One contends that the presence of nitrates in any appreciable quantity (being an indication of "previous contamination") must be considered as sufficient to condemn any water, however satisfactory in other respects; others pin their faith wholly to bacteriological examination; while others again refuse to judge without having all possible information as to source and method of collection and delivery, and then combining both chemical and bacteriological examinations to give them a basis for their report. But even if the examination and analysis be of the fullest possible nature, it is probable that hardly any of the experts would agree as to the actual purity of any given sample examined. It is therefore obvious that, whatever penalties Parliament may make water companies liable to, there is not the slightest chance of their ever being inflicted unless, and until, some standard definition is adopted as to what constitutes a "pure and wholesome" water, and what characteristics are required to exclude any given sample from this category.

Following upon this difficulty, comes another hardly less serious, and that is detection of pollution when (as is most often the case) it exists at the source for a very short period, perhaps only for a few hours, and may therefore reach the consumers entirely undetected in spite of the most regular and frequent analysis. And, again, there is the probability that examination, even at short intervals, would not reveal the existence of pollution in time to prevent the delivery of the impure water into the mains or reservoir supplying the district. Judging from the history of the outbreak of typhoid fever at Maidstone (as given in a paper read before the Society of Public Analysts by Mr. Adam, the Medical Officer of Health), it appears that even had the Corporation not discontinued the regular analyses of the water—as they unfortunately had done just previous to the outbreak—it is extremely probable that the mischief would have been done before anything unusual had been observed in the character of the water.

It is also to be remembered that the question whether pollution has arisen through accident or neglect must always be settled before a penalty could be enforced, as it would be contrary to all ideas of justice to punish a water-works company for allowing pollution which had been caused through unavoidable accident, or some means utterly beyond their knowledge or control. The settlement of a difficult question of this nature is sufficient alone to make such clauses as have been proposed entirely inoperative, or at any rate provocative of almost endless litigation.

With all these points before us, it will, I believe, be generally accepted as a very doubtful means of accomplishing the end in view to resort to any system of penalizing water-works companies convicted of supplying polluted water. Before dealing with the question of punishment for default, some effort should be made to secure in a practical manner the protection of water supplies from any pollution *at their source*, which, if satisfactorily accomplished, would altogether dispense with the necessity of punitive measures of any kind.

Power to Take Samples.

The further powers proposed to be conferred on local authorities and their officers under this head—and not only on them, but on consumers generally—are, of course, on the lines laid down for preventing adulteration of ordinary products, such as butter, milk, &c., and appear to me to be in some respects far too stringent, and in others not by any means strong enough. In the first place, as they now stand they suggest the possibility of some zealous consumer with nothing else to do busying himself in collecting samples from every available source both on the works and at the consumers' services, analyzing them himself, and forwarding duplicate samples to the water company at all times and seasons—a risk which is utterly ridiculous, besides being useless in the extreme; and, on the other hand, there is the probability that after the present agitation has subsided local authorities will, as they have done in the past, allow the matter to fall in abeyance (professedly in the interests of economy), an issue which is equally unsatisfactory. It is, I think, sufficiently obvious that for the proper protection of water consumers, periodical analyses and examinations of the water on some practical basis (which ought to be clearly defined) should be made compulsory on all local authorities alike, whether the water-works are in their own hands or in those of a company; and, further, that for the reasonable protection of companies and water-works officials generally, the power to invade the works and inflict duplicate samples and reports upon the company's officials should be strictly confined to some recognized sanitary officer—preferably one appointed for the purpose—and should be also limited as regards frequency and time of day. As I have already said, it is very doubtful if any system of analyses, however religiously followed, would secure absolute immunity from occasional and accidental pollution of water supplies; but there is no doubt that the Local Government Board would be well justified in prescribing some such rules as I have indicated for the guidance of local authorities, and if necessary for Parliament to deal with the matter by a General Act, amending the Water-Works Clauses Acts and the Public Health Acts as might be required.

Pollution of Source of Supply.

The two clauses under this heading are a great advance upon the preceding ones, and suggest a means of checking pollution which is likely to be far more effectual than anything previously specified. The examination by a properly qualified official of the works and land constituting the source of the water supply should, at any rate, give an indication both of risk and actual pollution in time for steps to be taken to prevent polluted water being supplied to the inhabitants. But here I must emphasize the fact shown by past experience, that it is utterly useless to confer *optional* powers on local authorities. To be effectual, these powers must be made compulsory, and must be very clearly defined; and, in my opinion, they might be considerably enlarged beyond what is indicated in the clauses in question.

Power to Enter Lands, &c.

The powers (or rather penalties for obstruction) of authorized entry on water-works, &c., detailed by these clauses are, of course, fair and reasonable enough. But it is worth while to examine the powers which local authorities possess in this respect under existing Acts of Parliament, before attempting to create new powers of this far-reaching character. This point will be enlarged upon in a subsequent paragraph.

Having thus briefly criticized the proposed clauses, and indicated the points to which further attention might profitably be devoted, I will now endeavour to further enlarge upon the latter in the hope of suggesting some practical *modus operandi*, by which such provisions may be made as will render the recurrence of serious epidemics such as have recently excited general alarm and severe local distress as near as may be impossible. In attempting this task, I am quite alive to the fact that while it is very easy to find fault with any proposals advanced with a view to solving a knotty problem such as this undoubtedly is, it is by no means so easy to suggest a practical and practicable method of getting over the difficulties which must be inevitably met with. Having, however, recently made a careful study of the parliamentary powers and obligations of water-works authorities, both municipal and commercial, and also having had some experience in the design and construction of water-works, I am hopeful that my remarks may at any rate prove useful, even if they do no more than suggest the lines upon which further investigations should be conducted

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APPENDIX.

For the convenience of my readers, I append copies of the clauses that were proposed to be inserted in the Higham and Hundred of Hoo, Mid-Kent, and other Water Companies' Bills by the Local Government Board.

CLAUSES PROPOSED BY THE LOCAL GOVERNMENT BOARD, JUNE, 1898.

Penalty for Failure to Supply Pure and Wholesome Water (10 *Vic., cap.* 17).

1.—If the company fail to provide and keep such a supply of pure and wholesome water as is required by section 35 of the Water-Works Clauses Act, 1847, they shall, unless prevented by frost, unusual drought, or other unavoidable cause or accident, be liable for the first offence to a penalty not exceeding £20, and to a penalty not exceeding £5 for every day on which the offence is continued after conviction; and such penalties may be recovered summarily before a Petty Sessional Court.

2.—Any offence under this section may be prosecuted by any local authority acting in the execution of the Public Health Acts in any part of whose district the company supply water for domestic purposes, or by any person supplied by the company with water for domestic purposes.

3.—All penalties recovered under this section shall be applied in such manner as the Court may direct.

Power to Take Samples of Water.

1.—For the better enforcement of the provisions of section 35 of the Water-Works Clauses Act, 1847, any Medical Officer of Health or other person authorized by any local authority acting in the execution of the Public Health Acts for any district in any part of which water is supplied by the company for domestic purposes (producing, if required, a certificate of his personal authority signed by the clerk to the local authority) shall be entitled at any time, on giving not less than six hours' notice to the company, to take and carry away samples of water from any land, reservoir, work, building, filter-bed, main, pipe, stand-pipe, or stopcock of the company, from, through, or by which a supply of water is given, and may for that purpose enter upon any lands or premises of the company. Any person who obstructs or molests such Medical Officer of Health or other person authorized as aforesaid shall be liable to a penalty not exceeding £20 for each such offence; and such penalty may be recovered summarily before a Petty Sessional Court.

2.—Any water consumer may at any time, on giving such notice as aforesaid, take and carry away samples of water from any land, reservoir, work, building, filter-bed, main, pipe, stand-pipe, or stopcock of the company, from, through, or by which a supply of water is given, and may for that purpose enter upon any lands or premises of the company.

3.—Any samples shall be taken in triplicate, and shall forthwith be respectively sealed up and marked by the person taking the same, who shall leave one of such samples with the company or an officer or other agent of the company, and may submit another for examination if he thinks fit, and shall retain the third for future comparison if required.

4.—The company shall be entitled to be represented by an officer or other agent when the samples are taken, sealed up, and marked.

5.—For the purposes of this section, "water consumer" means any

person who is supplied by the company with water for domestic purposes, or who pays, or is liable to pay, any rate for such a supply.

Pollution of Sources of Supply.

1.—For the better discovery of any causes of pollution of the water obtained or supplied by the company, any officer of the company authorized in that behalf by the company and any Medical Officer of Health for any district whereof any part is supplied by the company with water for domestic purposes authorized in that behalf by the local authority for such district, may at any time between the hours of nine in the forenoon and four in the afternoon, on producing, if required to do so, a certificate of his personal authority signed by the secretary of the company in the case of an officer of the company or by the clerk to the local authority in the case of the Medical Officer of Health, enter on any land or premises from which water is obtained or supplied, whether immediately or otherwise, by the company, and may take and carry away samples of any water or of any matter, substance, or liquid which may appear likely to cause pollution to the water of the company, or to the sources of supply of the company, or whereby such water may be fouled.

2.—Any samples shall be taken in triplicate, and shall forthwith be respectively sealed up and marked by the person taking the same, who shall leave one of such samples with the person having the custody of the premises, and may submit another for examination if he thinks fit, and shall retain the third for future comparison if required.

Power to Enter Lands and Premises for the Purpose of Taking Samples and Discovering Causes of Pollution.

1.—If any water consumer authorized by section 2, or any person authorized by or under section 3, to take and carry away samples or to enter on any lands or premises is refused permission so to do, any Justice having jurisdiction in the place where the land or premises is or are situate, on complaint thereof on oath by such person (made after reasonable notice in writing of the intention to make the same has been given to the person having custody of the premises), may, on reasonable cause being shown, by order require such person to admit the person authorized as aforesaid upon the premises during the hours mentioned in the order, and to permit and to give all facilities to him to take and carry away such samples as aforesaid.

2.—Any order made under this section shall continue in force until the purposes for which such order was made are completed; and any person who refuses to obey an order so made shall be liable to a penalty not exceeding £10, and any person who obstructs or molests any person authorized to take samples shall be liable to a penalty not exceeding £5 for each such offence—such penalties to be recovered summarily before a Petty Sessional Court.

(To be continued.)

TECHNICAL RECORD.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

The Papers and Discussions at the Annual Meeting.

In the "JOURNAL" last week we published a general report of the proceedings at the annual meeting of the above-named Association, held in Glasgow, under the presidency of Mr. T. WILSON, of Coatbridge. We now begin the papers and discussions.

RETORT-SETTINGS, AND PRACTICAL RESULTS OBTAINED.

By W. EWING, of Hamilton.

Our President having selected the title of "Retort-Settings, and Practical Results Obtained," as a subject suitable for consideration at this meeting, and one calculated to create a profitable discussion and helpful exchange of ideas, I consented, after some hesitation, to do what I could in preparing a paper on the lines indicated. I purpose giving you a short description of the condition in which I found the gas-works of the Hamilton Corporation on taking over the duties of Manager there, in the autumn of 1892, and the means I adopted to overcome the difficulties which immediately presented themselves.

Soon after being installed at Hamilton, I found that the condition of the works had been reported upon by an expert prior to my installation. This report stated that the plant was then at its utmost limit of production, and that the plant and buildings generally were rather antiquated, and in need of repairs and extension. The retort-benches then contained in all 57 retorts. These were all on the direct-firing principle; and great difficulty had been experienced, during the winter previous to my taking up office, in supplying the growing demand for gas during the maximum consumption. This, however, was ultimately successfully overcome by building settings of retorts on a simple generator principle in room of the old settings removed, without extra cost. The maximum storage capacity was, at that time, 255,000 cubic feet, though at times the available capacity was as low as 200,000 cubic feet, on account of the water leaking from the gasholder tanks through cracks caused by underground workings. From the same cause, notwithstanding constant repairs, the main pipes and services were in a very bad state—leaking all over the town, and causing the leakage or unaccounted-for gas to assume the enormous figure of 22·5 per cent. of the annual production.

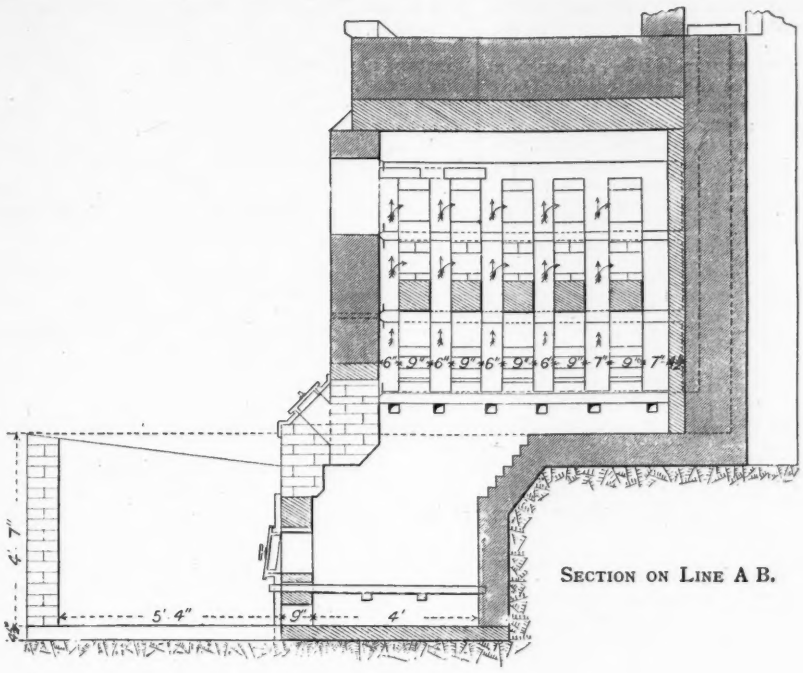
In works so much congested as ours, difficulties were the order of the day, and were, of course, peculiar to the works and the locality of the situation of the plant in which they had their existence. The Convener and members of the Gas Committee offered me every support in combating these difficulties, with the result that during the winter of 1892-3 we found ourselves in, comparatively speaking, still water, and this without any capital expenditure, which had been strongly advocated at the time, but at the cost of much physical energy. A large scheme of extensions was under consideration at the end of 1891; but when my Committee found how I had tided over the following winter and met the increased demand for gas, having regard to the favourable results obtained by the substitution of a simple generator setting of retorts, they decided to delay, for a time at least, any further consideration of extensions.

The simple generator setting of retorts which I have referred to, and which was designed to meet special circumstances, is shown by the drawings. They were introduced into each oven (excepting two settings of twos) as the old settings required renewing; and the cost for material and labour being practically the same as that required for the older systems, no extra expenditure for the same number of retorts was entailed—the work being done by our own employees. Into each oven that formerly held only three and four retorts I introduced five and six. This was accomplished by reducing the floor to the level shown on the drawings. The retorts were of the same sectional area as those formerly used, but were 6 inches longer. The dimensions of the old retorts were 8 feet long by 24 in. by 14 in., and of those introduced 8 ft. 6 in. long by 24 in. by 14 in. This additional 6 inches in the length of the retorts necessitated their projecting beyond the front walls of the settings; but this had the double advantage of giving one a larger carbonizing area, and consequently greater yield of gas per retort, as well as practical immunity from choked ascension-pipes, which pleasing circumstance it has always been my lot to enjoy. In my experience, I have found that if the ascension-pipes are of ample bore, and fixed so that they are a few inches off the perpendicular, the condensable tarry matter runs down one side of the pipe, instead of spreading round its whole area, and thereby prevents choking when high heats are in use.

When all the old direct-fired settings had been replaced by those of the newer design on the generator principle, we found that we had, in the same space, added an additional 25 retorts; thus having 82 available retorts, as against 57 hitherto. The productive capacity was raised by this means from 330,000 to 750,000 cubic feet; and this for the trifling cost of £150 for additional retorts. My object in introducing this system of retort-setting was, at the outset, to be able to maintain higher heats, increase the yield per ton, and save fuel; but I also found that with the increased number of retorts in the same ovens I could produce 100 per cent. more gas. The working results came as a pleasant surprise to my Committee, who were deeply interested in the arrangements, and who awaited with much interest the result of the first year's working.

For manipulating these settings of retorts, the usual care is required in regulating the dampers, secondary air, and steam. The regulation is done gradually, and the openings increased till the required amount of each is obtained. The setting then requires no further attention, excepting the clinkering process, which is occasioned once in every eight or ten days, and the feeding of the producer with hot coke direct from the retort. I have found that the best results are obtainable with a depth of from 3 to 4 feet of coke in the producer. The furnace bars have a hole at the end and project 3 inches in front of the furnace door in the producer pit. They are shaken up every eight hours, after which the top door of the producer is opened, and the remaining clinker and coke are pushed down on to the bars and allowed to settle, so that no space is left between the bottom of the coke in the producer and the furnace bars. The steam-jet underneath the producer bars makes the clinker very friable; and the greater part of it is reduced to powder by the action of shaking the bars. The secondary air is admitted at the front of the retort-bench, immediately underneath the bottom retorts, through a slot in the brickwork communicating with five graduated secondary air flues to the producer, where it meets the producer gases in the combustion chamber, and at once combines with them. The products of combustion are first led upwards through the setting, then down both side flues simultaneously; making their final exit along the flue underneath the bottom retort, and thence up a vertical flue in the wall behind the setting to the main flue situated on the top of the bench. I have always found this setting to give equal heats throughout the oven; any local heating being overcome by an arrangement of dampers and slip bricks inside the setting, which are either opened or partly closed to obtain the desired result. The slot in the brickwork, through which the secondary air passes, is regulated by means of a brick; and I find that for a setting of five or six, with a draught on the chimney equal to 1 inch of water, an opening 3 inches by ¾ inch is suitable.

It was not till 1894-5 that we derived the full benefit of these settings; but during that year they did good work, giving us practical proof of their utility and amply justifying their adoption. The make of gas per mouthpiece averaged from 8500 to over 10,000 cubic feet; and the fuel account was from 16 to 20 per cent. of the total coke made—assuming the yield of coke from local cannels to be 11 cwt. per ton of coal carbonized. The yield of gas per ton of coal carbonized was, for some, about 11,000 cubic feet from local third-class cannels, and which the printed form of analysis showed as giving 10,860 cubic feet per ton. To ascertain the actual yield of these cannel coals with high heats, I made three different tests on a working scale, with a resulting average yield of 12,300 cubic feet per ton, the coals



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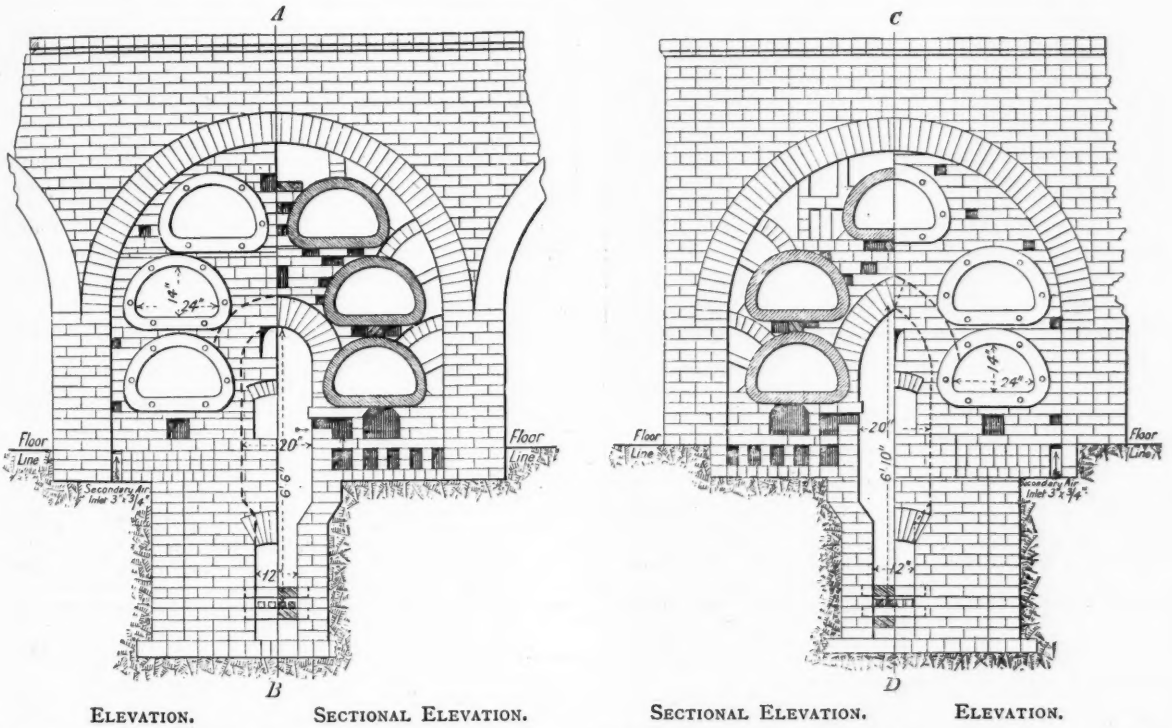


ELEVATION. SECTIONAL ELEVATION. SECTIONAL ELEVATION. ELEVATION.

being carefully weighed. After a few months' trial with very high heats, we found a great difficulty in getting the tar to flow freely from the foul main, owing to the hydraulic main being so near the top of the bench—there being only 12 inches space between them. The tar contained in the hydraulic main began to distil, and so caused no end of trouble in necessitating the drawing of the thick tar from the drip-box by hand, and then putting it into open barrels. This caused us to exercise great care to prevent the complete solidification of the contents of the hydraulic and foul mains. This was a most hazardous and disagreeable task; and to prevent it, and a probable stoppage of the works, we found it safer to make about 10,000 cubic feet per ton.

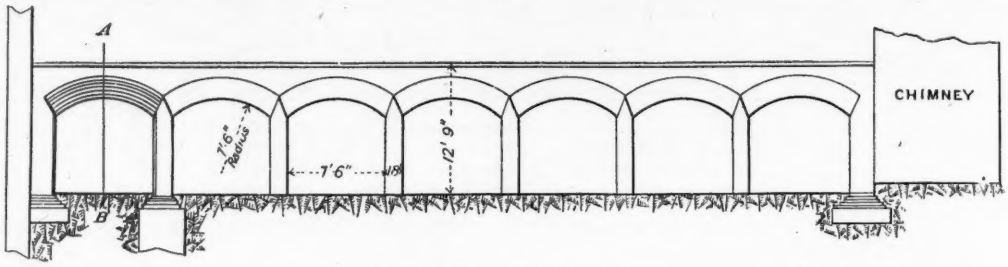
The table of working results shows an improvement in the returns from 1893; but the greatest improvement in results is from 1894 to 1898, for during these years I had practically the full use of the new settings. I must also include the year 1891-2, as during the whole of this year direct-fired settings were in use. Only one half of the following year (1892-3) was under my management. It will be noticed from this comparison that the make of gas increased from 61,750,000 cubic feet in 1892 to 102,000,000 cubic feet in 1898; and I am much pleased to say that during the current year we shall be paid for 100 per cent. more gas than in 1892. This, in a sense, is largely due to the great reduction in the leakage account, which, after several years of downright hard work, has been reduced from the unenviable figure of 22·5 per cent. in 1892 to about 10 per cent. for the current year. At present our output of gas is 25 per cent. more than it was this time last year; and I calculate that our make of gas this year should be anything between 110 and 120 million cubic feet. The returns for tar and liquor have been variable—ranging during the past four years from 55·65 to 70·95 gallons per ton of coal used. The fuel account, too, has been variable; but the average, after allowing for shale and the firing of boilers, is 21 per cent. of the total coke made.

Early in 1895, I reported to my Committee that I could not take the risk of carrying on the works another year without certain extensions, including a new gasholder, to be completed ere we entered into another winter—the maximum output of gas having reached 2½ times the available storage capacity of the holders. I was instructed to report and give a plan and probable cost of the proposed extensions. These proposals were passed in Committee, and fought bravely for in Council, but were ultimately sent back for further consideration. However, during the following summer, after a delay of several months, the scheme of extensions, as originally sketched out by me, was finally passed, and the work proceeded with, but too late to be of service for the ensuing winter; and, in consequence,

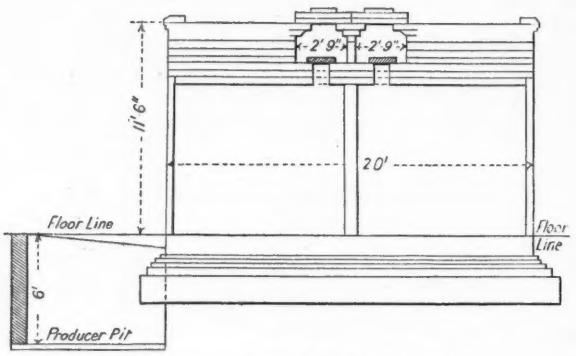
the loss all round was pretty heavy, and the working results considerably reduced. The result of this long delay may be seen in the table.

The winter of 1895-6 came thus unprovided for, although a strong effort was made to get part of the plant ready. One-third of the available retorts were exposed to the weather without any roof covering whatever; but, notwithstanding these inconveniences, we were successful in supplying the demand for gas during the Christmas and New Year weeks—including the record maximum output of 703,000 cubic feet—and this with only an available storage capacity of 230,000 cubic feet. This was an anxious time, as you may suppose; but it was overcome without any inconvenience to the public. Seeing that these old benches of retorts were condemned as inadequate for the requirements of 1891, it was but natural to expect them to be somewhat dilapidated, and unprofitable to work in 1896-7, although as much gas has been made in these latter years in the same ovens as in the thirteen years previous to 1891.

To meet the requirements of a rapidly-growing consumption, I designed a double bench to contain 112 retorts—14 settings of eights—on the same generator principle as those already in use. A rough outline sketch of this bench is shown here, which



Arches for 112 Retorts.



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cost, exclusive of all ironwork, £13 per mouthpiece, or £22 per mouthpiece inclusive of ironwork, complete. A few settings in the old bench having been in use, together with the settings of the new bench, I had no opportunity of comparing the new with the old settings. However, within the past few days, I have had two settings of eight in the new bench working side by side, with good results. They are making about 10,000 cubic feet of gas per mouthpiece per 24 hours with a return of 10,000 cubic feet per ton of coal carbonized and a fuel account of from 18 to 20 per cent. At the time of writing, our daily output averages from 150,000 to 200,000 cubic feet, one-half of which is set out during the daytime—*i.e.*, from six in the morning till six at night.

The cost of carbonizing per ton of coal, which includes breaking coal, labour, firing boiler, and looking after governors and exhausters, runs from 1s. 8d. per ton, when the men are working full, to 2s. at other times, when the men are not so fully employed stoking. The cannel coal is now delivered at a level higher than the retort-house floor, and is always brought forward to the face of the bing by making the horse and cart travel along

COMPARISON OF WORKING RESULTS AT THE HAMILTON CORPORATION GAS-WORKS FROM 1891-2 TO 1897-8.

Year.	Coal Used. Splint, Cannel, and Shale.	Cost of Coals.	Cost per Ton Used.	Gas Made.	Total Received for Residual Products.	Total Received for Residual Products per Ton of Coal Used.
	Tons.	£	s. d.	Cubic Feet.	£ s. d.	s. d.
1891-2	7,515	5099	13 7	61,738,900	2319 8 2	6 2·06
1892-3	7,449	5315	14 3	70,058,500	1418 14 6½	3 9·72
1893-4	7,296	3087	8 5	71,876,000	1578 11 2	4 3·90
1894-5	7,772	3252	8 4	80,623,100	2607 8 2½	6 8·64
1895-6	10,032	4323	8 7	95,637,800	2361 7 1½	4 8·49
1896-7	10,803	4150	7 8	105,000,000	2424 18 11	4 6·13
1897-8	10,606	4375	8 3	102,018,900	2181 9 0½	4 1·60

Year.	Coke.					Tar and Liquor.				Spent Lime.		
	For Sale but not including that Used in Boiler.	Saleable per Ton of Coking Coal.	Sold.	Rate.	Amount Received.	Due to Year and Sold.	Rate per 100 Gallons.	Amount Received.	Quantity per Ton of Coal Used.	Sold.	Rate.	Amount Received.
	The average amount of fuel used from 1894 to 1898 was 21 per cent. total production of coke.	Does not include coke used for firing boilers.	Cwt. Tons.	s. d.	£ s. d.	Gallons.	s. d.	£ s. d.	Gals.	Tons.	s. d.	£ s. d.
1891-2			1353	5 10	396 8 11½	372,965	9 9 / 10 1	1893 12 3	49·63	518	1 1	29 7 11½
1892-3			1146	5 7	318 19 9½	385,657	10 1 / 3 7	1059 3 5	51·77	668	1 3	40 11 4
1893-4			2021	5 3	533 5 0½	433,228	3 7 / 4 9	1009 19 0½	59·37	615	1 2	35 7 1
1894-5			3312	8·10	3067 5 9	883 4 10½	546,458	4 9 / 6 3	1644 19 0	70·30	1035	1 6	79 4 4
1895-6			3441	7·54	3140 5 1	799 9 1½	558,313	6 3 / 5 0	1491 3 4	55·65	943	1 6	70 14 8
1896-7			3636	7·34	3086 4 9	738 13 9	665,947	5 0 / 4 9	1626 4 1½	61·64	802	1 6	60 1 0½
1897-8			3935	8·27	4380 4 2	910 17 7	752,581	4 9 / 3 0	1225 3 2	70·95	617	1 6	45 8 3½

the top of the coal, when it is tipped over the face towards the floor. I have found that the coal can be broken ready for the retorts at something like 1½d. per ton against the handling and breaking of coal, which was the case formerly, at a cost of from 4d. to 6d. per ton.

This year's price for residuals is the lowest on record; but, notwithstanding this, and considering the extra facilities given by the new plant, and that corporations are supposed to sell gas at cost price after paying interest on loans, and allowing a reasonable sum for depreciation, I am very confident when I say that we are in a position to sell gas at 1s. 9d. per 1000 cubic feet, and meet all the necessary obligations. This would then put us in the position of selling gas of 23 standard candles at 0·91d. per candle.

It is not to be inferred from these increased results that the duties of the workmen have also been increased; and although the number of employees is less than formerly, their work is now much less fatiguing, their working hours are reduced, and their

pay is increased. Good working results can only be obtained by careful and judicious management, and by strict personal supervision and skilled assistance in every department of the works, without which all the combined energy of the very best form of generator or regenerator settings and apparatus would be of no avail, and could not be expected to give results that were entertained, but neither attempted nor catered for. Good results, gentlemen, are within the province of every one of us, and should be diligently and thoughtfully sought after.

Discussion.

The PRESIDENT said he was sure the members were all very much indebted to Mr. Ewing for his valuable paper, which must have cost him a great deal of time to prepare. He thought they would all be able to learn a lesson from Mr. Ewing, who talked of getting 11,000 cubic feet of gas per mouthpiece; at Coatbridge they were well satisfied if they got 9500 cubic feet.

Mr. J. NAPIER MYERS (Saltcoats) agreed that the thanks of the members should be given to Mr. Ewing for his paper, as well as for the trouble he had taken in bringing so much information before them. He thought, however, the statistics towards the end of it might have been taken as read, as no one, though he had a head like a line-of-battle ship, could have carried this mass of figures. He (Mr. Myers) understood Mr. Ewing to say that the secondary air was taken from underneath the last flue of the side retorts. Did he not think it was a weak, or faulty, arrangement to heat the secondary air by the last flue underneath the bottom retorts? Did it not tend to rob the floor of that retort of the heat carried into the furnace? He should like to hear what Mr. Ewing had to say as to the arrangement.

Mr. W. CARR (Stalybridge), on being invited by the President to take part in the proceedings, expressed his pleasure in speaking upon the paper. He said that if he had had a copy of it in his hands, he thought he might have been able to offer some comments upon the work Mr. Ewing had done, and had so carefully described. But, gathering, as he went along, as nearly as he could, the results the author had achieved, he must say that they were particularly good. He agreed with the previous speaker in regarding the setting as very faulty in principle. Whatever the results obtained from it, it did not strike him as being a scientific setting at all. He thought the weak point was the one referred to by the previous speaker—the place where the secondary air supply was taken. He listened very attentively to the paper, and he gathered from it that Mr. Ewing was just persevering with the same setting of retorts that he put in at first. Probably, from the good results he obtained he felt warranted in doing so; but he (Mr. Carr) should have thought that, having accomplished so much with so little, he would have tried to improve upon the matter, and have gone a little farther. Like Mr. Ewing, when he went to Stalybridge early in January some two or three years ago, he found that all the retorts were at work—every mouthpiece there was in the place—and they could not keep the gasholders up. They had to work at reduced pressure for fear of the gasholders landing. During the following summer he took out 92 mouthpieces. He did not try to utilize the arches as they then were, because some of them had seven retorts in them, with direct firing. He took out the whole of the bench, and erected a new installation of regenerative furnaces, on what he considered to be the most scientific principle; and he put in 144 mouthpieces in place of the 92 taken out. But in order to do this, he had to put 9 retorts in every setting—three tiers of three each. During the past winter, he was unfortunately compelled to be away from the works a great deal. He might mention that last summer he started to take the second half to pieces, and reconstruct it; but, owing to his illness in the autumn, he was unable to complete the work. He was left with 70 of the retorts which should have been done away with; and he had to "face the music" with the 144 new retorts erected on the regenerative principle. The men managed to get through the winter very easily, without requiring to put the old retorts to work. They had not been able to accomplish the extraordinary result of getting 10,000 or 11,000 cubic feet of gas per mouthpiece; but he did not feel discouraged by that, because he did not think the make per mouthpiece was a true criterion of the worth of a setting. He could get a great deal more per mouthpiece than he did; but he thought it would be at the sacrifice of economy in working. Of course, his retorts were not so large as those of Mr. Ewing; they were 22 inches by 14 inches. But, even so, he did not, under any circumstances, consider it was wise to go in for a very large make of gas per mouthpiece. He did not find that those people who claimed very large makes per mouthpiece—Mr. Ewing, of course, excepted—produced very cheap gas. But Mr. Ewing had done so and had put in what appeared to him (Mr. Carr) to be, to the best of his recollection, the cheapest setting of retorts he had ever heard of; for £22 per mouthpiece for retort-settings, with ironwork included, was, he thought, exceedingly low. His (Mr. Carr's) brother claimed to have done it at £26 per mouthpiece; and the installation which he himself put in came to a fraction under £27. Mr. Chester, in a paper he read before The Gas Institute in 1894, spoke of a setting coming out at £46, which he considered a very low figure. This included the flooring and all other matters. His own did the same. Outside of the flooring, he did not see how the retort-mountings could be much more extensive in the one case than the other; and as Mr. Ewing had succeeded in doing the work for £22 per mouthpiece, he had certainly given them something to think about, as to how they were to reduce the cost of their settings. He had listened to the paper with very great pleasure, and he should read it with even greater pleasure, because he had not been able to follow the figures of comparison.

Mr. J. M'GILCHRIST (Dumbarton) said he should be glad if Mr. Ewing would tell them exactly what he included in the £22. It seemed such a very low sum, that he was afraid the price of the excavation, or work of that kind, must have been left out. However, he thought, after what they had heard Mr. Ewing say, they might give Hamilton the very top place in connection with the cheap and economical manufacture of gas. He thought they might call it the Widnes of Scotland. He was very pleased to have heard the paper, and he trusted they would all read it with greater pleasure than they had listened to it.

Mr. D. VASS (Edinburgh) thought that Mr. Ewing mentioned one little point, with reference to the heats being so high that they caused pitching in the main, and had compelled him to lower the heats. He thought it would have been a great advantage if Mr. Ewing had been able to retain his high heats and also to do away with the pitching. He had had a little experience of it during the past winter; and he was glad to say he had got over it by putting in a sort of cushion of sand on the top of the bench. By this means the heat was kept away from the hydraulic main, and they were able to maintain their heat in the ovens. It was only a little experiment on their part; and he was glad to say it had been successful.

Mr. A. WILSON (Perth) said he was in a like position with Mr. Ewing in having these furnaces in use at his own place. He supposed Mr. Ewing was of opinion that this was the best system of firing, and had pinned his faith to it, as he was contemplating the erection of a bench of 112 retorts upon the same system. He (Mr. Wilson) could understand his adopting such a method of firing in a case of emergency, as he had to do the same thing himself. They were in the unfortunate position of being very much cramped for room, and were removing their works; and so he found it necessary to adopt some other system of firing, to enable them to go on until they had the new works erected. He therefore adopted the system Mr. Ewing had advocated. But he did not like it at all. He would as soon see it out in the ash-heap, if he could afford it. He had had a little experience of open furnaces, and also of regenerative ones; and he could assure the members that, in his opinion, the regenerative was not only the best in every way, but the cheapest in the end. It might cost a little more to begin with, but it was really the cheapest process in the long run. Mr. Ewing stated that his carbonizing wages were something like 1s. 8d. per ton. This was not very low—he thought it was just about an average. Also, he would say, from the quantity of spent lime Mr. Ewing had been selling, he thought his purification had cost about an average. Might he take it that probably Mr. Ewing's standing charges had something to do with his cheap selling price for gas? He should like to hear something about this. He was sure all the members would feel greatly indebted to Mr. Ewing for having told them that he got from 10,000 to 11,000 cubic feet of gas per mouthpiece. From Mr. Ewing's own figures, he found that he carbonized 10,600 tons of coal, and made 102 million cubic feet of gas, which was about 9600 cubic feet per ton. There was one other question he wanted to ask—why Mr. Ewing, in his setting, had all the secondary air-ports, or nostrils, so small at the front, and getting larger as they went back.

Mr. A. MACPHERSON (Kirkcaldy) said the first thing that had occurred to him, on looking at the setting, was that it appeared to be a very old and familiar friend of his, designed by him for a small works at Dysart fifteen years ago. He then devised the arrangement for heating the secondary air for the purpose of saving excavation. The foundation was rock; and it would have been very expensive to excavate. He agreed with Mr. Carr that the setting described was not constructed on scientific principles; but he said it was a profitable one for small works. The results which had been obtained with it quite justified its application to any small works where regenerative settings would be far too expensive. They would find that with retorts set on this principle they could easily produce 9000 to 10,000 cubic feet of gas per mouthpiece in 24 hours, at an expenditure of something like 25 per cent. of the entire coke produced. He thought that anyone who wished to introduce such a system in a small place would never rue it. At the same time, he quite agreed with Mr. Wilson that an out-and-out regenerative system was *the* system. He had had experience of direct firing, and also of the semi-regenerative and the full regenerative systems; and certainly he thought the last was the proper setting for works of (say) more than 50 million cubic feet a year. The cost of the settings described seemed to him to be something altogether abnormal. He was afraid there was nothing charged for excavation—preparation of foundations, or floorage, or anything like that, because, from the knowledge he had gained in the construction of the ovens which he had set at Dysart, and which he had since set at other small works, he found that it worked out, without any flooring, but with the preparation of the necessary foundations, at nearly £28. How Mr. Ewing could do the work for so small a sum as £22 was more than he could conceive. He was not calling the figures in question; only it was wise, in these things, to know exactly what was included and what was left out. Otherwise, they might be going on different bases altogether.

The matter which Mr. Ewing met with—the thick tar—he (Mr. MacPherson) had also encountered; and a most peculiar experience he had with it. In working a regenerative setting, he found, to his horror, one Saturday night, that the pressure would not come down in the retort-house, do what he might. It was down everywhere, but only a little from the hydraulic main. Luckily he had a short distance off a cover which he unscrewed, and he found that in a 12-inch pipe there was a passage of only about 3 inches; the other 9 inches being blocked up with thick tar, which he could pull out and spin like a rope. The only way in which they could remove the tar seemed to be by steaming it. However, he thought that, as it had gone so long, it might go a little longer. So he closed it, and kindled up a new set of retorts, to get a stock of gas. After getting this, he opened the pipe and found it to be as clean as possible—the heat of the new retorts had been sufficient to again liquefy the pitchy tar. A very effective method of removing such tar, and doing away with choked ascension-pipes, he had found to be the running in of some weak ammoniacal liquor. He was not quite sure as to how it was brought about; but it struck him that by the cold liquor going in and the hot tar coming off, it was so cooled down as to prevent the naphtha evaporating.

Mr. R. F. Hislop (Paisley) said it was a well-known fact that regenerative settings were more costly than generators; and he was convinced that, notwithstanding the good results which Mr. Ewing had obtained at Hamilton with the latter, in comparison with the old system of direct firing, if he had adopted a modern system of regenerative settings these results would have been much better still. There was, for instance, greater durability in the settings, as, after two, three, or more years' working, the first renewal was necessary only for the bed of the bottom retorts, and for the regenerators after twelve or fourteen years; whereas with generator furnaces the whole of the settings had to be renewed every two-and-a-half or three years. With modern regenerative settings, the secondary air had a much longer and more effective contact with the waste gases on their way to the chimney, and consequently they met with the producer gases at a much higher temperature; and these two, rising in vertical columns along the length of the producer arch, commingled in or above the combustion chamber, above the arch of the producer, with the result that the heat was distributed evenly throughout the setting, instead of above the fuel, as in the case of the generator settings referred to. Although Mr. Ewing got about 10,000 cubic feet of gas per mouthpiece, 12,000 cubic feet might easily be obtained. Mr. Carr seemed to doubt that Mr. Ewing got 10,000 cubic feet per mouthpiece; but he must bear in mind that Scottish and English coals were considerably different, and that it might be as easy to obtain 12,000 cubic feet of gas per mouthpiece from some Scottish coal as to get (say) 9000 cubic feet from some English coal. With regard to the fuel account, he noted that Mr. Ewing set it down at from 15 to 20 per cent.—an amount which, without complete regeneration, must be entirely erroneous. The error was clearly attributable to finding the coke used by difference—that was, estimating the fuel used from the amount sold, the latter containing a considerable quantity of water. Consequently, if he multiplied his fuel account by two, it would be nearer the mark. In the Hislop settings, the waste gases were utilized, not only in heating the secondary air, but in raising steam for the producer, and in keeping the clinker friable; and, by recent improvements, there was no clinkering or using of bars, and no waste of fuel during the heating, and the work was accomplished in about five minutes. They were indebted to Mr. Ewing for his paper, since it had elicited a considerable amount of discussion.

Mr. A. Yuill (Alloa) remarked that there were certain facts specified by Mr. Ewing—the results he had obtained—while in the diagrams he showed the retort-settings. There were several points to which some of them might object. At least, from his own experience of gaseous firing, Mr. Ewing's plan was a mistake; the source of heat being so pent up in the system of flueing. There was a difference between ordinary and gaseous firing, as in the one case they required a much larger draught than in the other. With gaseous firing, they would notice that, when the firing-door was open, the flames belched forth, instead of there being a current of cold air pulled in through the setting when the furnace door was opened for the drawing of the coke. In fact, there was no draught; there was a vacuum—there was no pull at all on the retorts. As to the supply of the secondary air, he thought this was another point which they ought not to copy from Mr. Ewing, because, if they took a section of the supply, as shown, they would find that for the secondary supply they had the one side cold. There might be heat, and a considerable amount of it; but they would not have the same heat as they would if the secondary air were surrounded on the one side by the waste-gas flues, and on the other by the furnace wall itself. Therefore his opinion was that it was a mistake. Then as to the sizes of the air-ports, leading in, and the supply of the furnace gases rising from the producer, he had always found it to be beneficial to concentrate the gases rising from the producer, so as to bring them into intimate contact with the secondary air, so that, as it were, the two would meet and commingle. He had always found that the nearer they brought the secondary air to the supply of the gaseous fuel rising from the producer, the more beneficial it was. With regard to the cost of fuel, he admitted that if they were able to reduce the temperature of the gases as they left the furnace, they were doing what they could to minimize the cost of fuel. In this case he could not see how they could reduce the temperature of the gases, as they left the retort-setting, to what they found in a full regenerative setting. Therefore, if they were losing heat they were losing in value, no matter what their results might be. A setting of fives was shown. He had always found that a setting of this number was not advantageous, in this sense—that they could not have one unless they thoroughly protected the top retort, which must be at an expenditure of heat, otherwise the retort would be burnt out. Better results, he thought, were obtained in settings of four, six, or eight, because in that form they got a free exit right over the retorts. Mr. Ewing spoke about the pinching of the furnace bars. In his opinion, the setting did not lend itself to allowing them to get the full command which they ought to have. They ought, in his opinion, to have the full command of both the primary and the secondary air, and also of the gases leaving the oven; otherwise they would not have the full command of the setting. He believed the damper had as much to do with the effective working of the oven as the air supply. His friend beside him [Mr. Hislop] had anticipated him to a certain extent with his new arrangement, and the clinkering of his furnace bars. Last year he put in one setting in which they had done away with side pans, and had been able to have complete control over the supply of primary air, besides making the system of cleaning much easier than formerly. They only required, as it were, to clean the furnace every two days.

Mr. W. B. M'Lusky (Selkirk) said he should like to know the quantity of coal put into the retort, the duration of the charge, and, as nearly as possible, the percentage of ash in the coke; also whether Mr. Ewing found it an advantage to burn the fire down every eight hours, and strip the soles free from clinker—whether he found this an advantage for bridging the fire and drawing the ashes from the bottom every 24 or 36 hours, as was common with the Hislop setting. Something had been said about the setting before them not being scientific; but this was altogether beside the question. He thought Mr. Ewing was to be complimented upon the results he had obtained. It was as an ounce of theory to a ton of practice; and Mr. Ewing had his ton of practice. He should like to know whether those who were questioning this setting were realizing, with their scientific settings, results which would compare with those Mr. Ewing was getting. This might explain the reason for Mr. Carr not believing in a great yield of gas per mouthpiece. They in Scotland liked 12,000 cubic feet per mouthpiece, if they could get it; and it had been got in the Border district for eight years consecutively, by Mr. Walker, at Berwick-on-Tweed. Mr. Walker had produced 150,000 cubic feet of gas from twelve retorts. This had never been reached with an ordinary setting. Of course, it was obtained with a "scientific" setting; and if Mr. Ewing got 10,000 cubic feet with his setting, he did well. This also pointed to the benefit of having a manager who was constructed on scientific principles, because they might have a scientific setting, and not a scientific manager. He considered that he had a scientific setting; but possibly he was not a scientific manager, because he could only get 9000 cubic feet of gas per mouthpiece. He should like to ask Mr. Ewing if he found any difficulty with the coke closing when it was more than 4 feet deep, or if he had any difficulty in drawing the air through.

Mr. Ewing, in reply, said Mr. Myers and Mr. Carr mentioned that they thought a great amount of heat would be absorbed by the air underneath the bottom of the retort. He (Mr. Ewing) could not say. He had never tested, nor had he the means of testing, to ascertain it. Mr. Carr considered that a regenerative setting would have been better, even at some extra cost. Of course, he had to act according to circumstances, and, from the results, he found that it was cheaper and more effective to work this setting than those he had in the old benches. Mr. M'Gilchrist had spoken about foundations. In connection with these new settings, strange to say, he originally intended to construct them on the regenerative principle; but unfortunately, on account of the quantity of flint rock underneath, it would have been necessary to incur an outlay of not less than £100 in excavating for the producers. The cost per mouthpiece would thus have been considerably more than the figure shown. He had the advantage of a very cheap quotation for bricks, as well as for retorts; and the foundations were very shallow. The brickwork was built right on the hard rock. There was only one part, at the back, where they had to build up about 4 feet, and consequently they constructed the settings considerably cheaper than they would otherwise have done. But he had no hesitation in saying that under more favourable circumstances he could have built a setting for £20 per mouthpiece. Mr. Vass thought it would have been better to have had the main higher. There also he had to work according to circumstances. The "cloth" was cut, and he had to make the best of it. But in his next settings he had the main about 3 feet above the bench, supported on rolled joists. Mr. Wilson, of Perth, asked for information regarding the quantity of fuel sold, and such like. Of course, this was all given in the table, where he showed the quantity of coke sold and not that used in the boilers, and he found with the present settings that, working with a coal yielding about 11 cwt. of coke per ton, there was perhaps from about 8 to 10 per cent. of ash. If he

did not fire the boiler with it (there was a fair quantity used there, and he was sorry to say they did not use breeze), he could sell nearly 9 cwt. of coke per ton of coal carbonized. With regard to carbonizing wages and general statistics, of course he had not heavy standing charges. Even after having spent, during the past six years, between what had been added to capital and ordinary additions to capital, at least £26,000, and taking a lot of money from revenue for unredeemed capital, he supposed that nearly £30,000 had been spent in all. But, with all this, their total loan capital was only £35,000. Mr. MacPherson mentioned that this setting was an old friend of his. He (Mr. Ewing) did not pretend that the setting was original; and he had never done so. It was only a design to suit circumstances. Mr. MacPherson mentioned that his cost per mouthpiece was £28. Circumstances might have varied. He (Mr. Ewing) had his own retort-setter at Hamilton, and he found that he did the work most effectively, and at cost price, which made a big difference. He constructed the whole of these settings, except the ironwork, with his own men. Mr. Hislop had told them of the advantages of regenerative settings. This was altogether beside the question. He (Mr. Ewing) was treating of generator furnaces; and he had better results than the average obtained with regenerative firing. He thought that in gas-works where there was too much complication good results were never realized. The simpler the settings, the better the results. Mr. Yuill said he worked his producers at a vacuum. He (Mr. Ewing) had done so with this setting; and he had found by experiment during 24 hours, and also during another test of three days, a fuel account of 14 per cent. So that he did not see where the advantage came in of the elaboration which there was in regenerative furnaces, when he could get it, with greater simplicity, at about half the cost. Mr. Yuill preferred retort-settings of fours, sixes, or eights. He (Mr. Ewing) had found, in his experience, that a setting of fives was a weak one, though he had had such a setting working for three years without requiring anything more than a little repair to the front. Mr. M'Lusky wanted to know the quantity of coal carbonized per retort. He ran charges varying from 2¾ to 3½ cwt. for four hours. By running them for this time he found there was less wear and tear on the retorts. His settings, with the exception of one or two mishaps—the burning away of the arches and the like—he found to run from two to three years; and he had one which had gone on for three years constantly without requiring renewal.

The President remarked that they had learnt a great deal from the paper, but considerably more from the discussion. He was something like his friend Mr. Ewing. Mr. MacPherson said the setting before them was an old friend. Well, he was one of the old-fashioned managers, and he thought it was a great pity that they should have scientific, practical men among them that day who could not work such settings as this. Many years ago he was instructed to make inquiries as to regenerative settings. Settings of threes and fours were the most popular at that time. He made all inquiries as to cost, results, and so forth, and he found that, with his old, unchanged settings, he had better results, at about a third of the cost. He thought it was a great pity that practical men could not get better results without going in for expensive works. His settings at Coatbridge were pretty much the same as those before them, and he obtained first-class results. Both Mr. Ewing and himself had the disadvantage of having a small number of retorts in an oven. If they had a greater number, perhaps their cost would be down 10 or 11 per cent. Another manager might fancy a £46 setting; but so long as he (the President) could get as good results with a cheap setting, he was not going to introduce a dear one. He thought they would all be the better for the reading of Mr. Ewing's paper.

EXPERIENCES WITH PREPAYMENT METERS.

By Andrew Wilson, of Perth.

The introduction of these instruments for the control of the delivery of gas to the consumer marked a new epoch in the history of lighting by gas. By their means it became possible to include as consumers a class "whose room was preferable to their company," before their introduction, but who may now be looked upon as the best paying class of consumers.

Fully two years ago, these meters were introduced in Perth; and, as the popular saying goes, they immediately "caught on," so that at the present time over 1100 are in use. Of these, fully 800 are supplying gas to new consumers; the remainder to bad payers, and those who found a quarterly account too much of a sudden drain.

A certain amount of caution had to be exercised in fixing these meters, as applications for them were at first received from old consumers, despite the fact that the bulk of them were well served, and could well afford to run a quarterly account without feeling any inconvenience. However, in course of time, these unnecessary applications ceased to come in; and now applications are only received from new consumers, or from those who have compulsorily or otherwise ceased to be consumers by the ordinary system. A considerable number of these meters are fixed in conjunction with a griller, boiling-ring, or cooking-stove, which latter are fixed free of charge.

Prepayment meters fixed in this manner are greatly in favour with lodginghouse keepers. Last year the average number of these meters in use in Perth was 1020; the average consumption being 6000 cubic feet per meter. The gas-rate in Perth is 3s. 2d. per 1000 cubic feet; and 20 cubic feet are supplied for 1d., or at the rate of 4s. 2d. The extra revenue from this source was therefore 6s. per meter, or a total of £306. This sum we find covers the interest at 3 per cent. on the extra money expended on these meters; pays the working expenses of the system; and leaves a handsome balance.

The bulk of the meters are two-light drys, costing £1 18s. 6d. each, or 18s. 11d. more than the ordinary two-light meter. This sum, at 3 per cent. on 1020 meters, means £28 18s. 10d. per annum. A collector and a boy assistant are continually employed collecting the coin, at the respective wages of 29s. and 5s. per week, or a yearly sum of £88 8s. After deducting these two sums, we still have the respectable total of £188 13s. 2d. as the net profit by the use of this system over the ordinary one. You will observe I charge all the collectors' wages to this system, which I think I am entitled to do, as extra assistance was required shortly after its introduction.

The working of these meters entails more labour than the ordinary meters, as the coin collected weighs considerably more than a survey-book, and the collector may have to call six times before finding the consumer at home. The bulk of these consumers are millhands, and those whose work necessitates their being from home all day. Thus the collector's work is considerably increased from this cause. We find it also necessary to provide the collector with a light two-wheeled barrow to transport the coin, and a boy to be always in attendance on it.

Several short paragraphs have appeared lately in the West of Scotland papers giving the weight of copper taken by certain gas undertakings from these meters during one month. The figures I forget at present; but Perth with its modest 1020 prepayment meters collected last January 10 cwt. 2 qr. 18 lbs. of coppers from them. Such was the scarcity of coppers in the city during the month that it created serious inconvenience to several of the large shopkeepers, who besieged the Gas Offices clamouring for change. The matter was brought under the notice of my Committee, who could not however see their way to remedy it. Over the year, we collected 306,000 pennies, weighing 2 tons 14 cwt. 1 qr. 19 lbs. Such is Perth's record.

Regarding the meters in use, they are all of Scotch make, and have given us every satisfaction. Of course, at times, they have got out of order; but we found that this was oftener attributable to the fault of the consumer in not paying attention to the printed instructions than to any defect in the meters themselves. It is surprising how some people will disregard or misconstrue the instructions attached to each meter, and try to manipulate the meter in any and every way but the right one. Then, again, bent pennies were a source of great annoyance to us; but I am glad to say this difficulty has been overcome by the makers forming the slot of such a size that a badly bent penny will not enter—at least with any reasonable pressure—and making the case or barrel of the meter large enough so that the penny does not get jammed in it if forced through the slot.

Some of our consumers look upon the meter as a receptacle for all the pieces of tin or other material which may find its way into their possession; and they show an amount of surprise and indignation, when called to account for it, that is worthier a better cause. Others, again, seem to think that the abstraction of the coin from the meter is their just and due right as part owners of the gas undertaking. An example made of one or two of the latter in the Sheriff Court has had a lasting effect on the morals of their would-be emulators. There are others who use the meter as a savings-bank placed handy for their accommodation, by inserting florins instead of pennies. On the approach of the rent-day, many are the applications at the Gas Office for the collector to let them have the balance not due to us to enable them to meet the rent.

Such are a few of the experiences gained during two years' use of the prepayment system; and they are such as to justify our adoption of it.

A scheme to which I look forward with interest, is that of supplying and fixing free of charge, in conjunction with these meters, grillers and boiling-rings. The extra revenue which will undoubtedly accrue from the introduction of such a scheme will, I am sure, go far towards meeting the extra expenditure involved—much less covering the interest.

Discussion.

Mr. R. S. Carlow (Arbroath) said he thought the members were much indebted to Mr. Andrew Wilson for giving them his experience with prepayment meters. At Arbroath, he might say, they did not begin the use of these meters till far on in the year. Their year ended on the 31st of May; and it was after the New Year that they began to use prepayment meters. Since they had adopted them, however, they had put in between 300 and 400 of them. They had placed to capital account upwards of £700 as the price of the meters. On the other hand—he made a note of it on the previous day—they had gained from the prepayment meter system, during that period, nearly £180. This was from the month of January; and during that time, too, they were only putting in the meters occasionally. He considered they were making a very great profit from them. He was quite at one with Mr. Wilson that it was the correct thing

to do to provide certain consumers with prepayment meters. He had put a great many of them in the houses of consumers who used to burn oil; and, on the other hand, he had substituted them for other meters in the cases of consumers who caused a great deal of trouble—people from whom they did not know when they would get their money. If they carried on as at present, he had no doubt they would make a very good profit indeed for the Corporation. He thought the prepayment meter system should be considered by every gas manager present, because there was no risk whatever with it. There was no deposit needed—their money was there; and they should encourage, as far as possible, gas consumption in every way. As Mr. Wilson had said, they connected gas-stoves or boiling-rings, or any other form of gas apparatus, with a prepayment meter; and they were sure of their money. In such towns as Arbroath, where there were a great many mills, they would know that boiling-rings, costing about half-a-crown, were greatly used in the mornings and at meal hours, and gas was consumed by them to a considerable extent.

Mr. T. W. Ward (Stevenston) said that, from his short experience, and with gas at 5s. 10d. per 1000 cubic feet, the members would not expect that he had done very much with prepayment meters; but he had heard a great many complaints about the length of time a pennyworth of gas lasted. It was only from 2½ to 3 hours. In such cases he had found that the consumers were using No. 7 burners. He took off these burners and put in smaller ones; and he had had no complaints since then. He thought gas managers should, in putting in a prepayment meter, look to the size of the burners to be used.

Mr. J. Ballantyne (Rothesay) said he had a great many prepayment meters in use in Rothesay. He was about the first to introduce them; and he had had some strange experiences with them, especially where people went to Rothesay for the benefit of their health. They might be sitting up reading their favourite novel, and be just coming to an exciting point, when out would go the gas. This annoyed some; while others thought there were burglars in the house. However, they got over these things; and, so far as he knew, prepayment meters were giving great satisfaction. He thought they had about 600 of them. They very often had to go round to these meters between collecting times. Their regular collections were every four months; and frequently they had to go at two months, and take away the money. They often found as much as from 25s. to 30s. in the box. He rather thought that, in many cases, if they were to present a bill for 7s. 6d. to these people, they would say they were being robbed; but when they put in from 25s. to 30s. themselves, they never said a word. The Corporation had reduced the price of gas since the introduction of these meters; but, instead of changing the setting of the meters, they returned a certain amount to the consumers. When their man called, the consumers, instead of grumbling, were glad to see him, because they knew they would get something back. There was a great future for prepayment meters. They were only beginning to get into some towns. If they were carefully worked—not given to all consumers, but to consumers of other lights, and the like—they would be very profitable. He found he was opening many new accounts; and their income was increasing very rapidly. He considered that towns which were not introducing them were standing in their own light. He did not see why any gas manager should not be able to largely increase, if not actually to double, his consumption, by means of prepayment meters. They certainly cost a little more than others; but they did not give so much trouble now as at first, so that there was nothing to fear. Therefore, in this regard, and taken all through, he thought they had every reason to be thankful that they had prepayment meters at their command, because they gave them the opportunity of having as gas consumers people who would never have been in their ledgers.

The President said he had had a little experience with prepayment meters, as he had about 1400 of them in use at Coatbridge. He thought he was about the first to adopt these meters in Scotland. He was a little reluctant in doing so at first, as he considered they would not have a class of consumers for them. But he had found they had. Now they had somewhere about 25 per cent. of their meters on the prepayment system. Last year they sold about 7½ million cubic feet of gas through these meters. They had given satisfaction to everyone almost. Prepayment meters were largely used in his place as banks. They had had as many as twelve florins in one. It was no uncommon experience for people to come and ask them to take the money out, as the box was too full. They tried Mr. Ballantyne's method of handing money back; but he was not sure that it was altogether a satisfactory one. It certainly put the collector in a rather curious position, because the money must correspond with the index; and they considered that the better way was to set the indices again. They did this. No doubt it gave a little trouble; but, after all, two men did about 100 meters per day. They now had them all set to give 28 cubic feet of gas for 1d. Their ordinary price was 2s. 6d. per 1000 cubic feet. They had found prepayment meters to be a great benefit. Fourteen or fifteen of the largest iron-works in the district had introduced electricity; and they had lost them entirely as consumers of gas. But the extra revenue which had been brought in by prepayment meters had made up for this; and, instead of their having had a decreased consumption of gas in Coatbridge, they had had a slight increase.

Mr. A. Wilson, in reply, said this was his first contribution to their proceedings, and it was certainly very gratifying to think that the members had listened with such patience to one who was a tyro in the matter of reading papers. He found, like Mr. Ward, that people were going to ironmongers and getting large burners; and at first he had a little trouble in this way. Eventually, however, he got consumers to know that they should not use such burners. His Committee, when they introduced prepayment meters, did not see the force of charging poor consumers a higher price for gas than rich ones; and the consequence was that, the consumers by prepayment meters getting their gas at the same price as the others, while the Committee were paying something like 18s. 11d. for a two-light dry meter, they lost upon them that year. The profit derived from these meters did not pay the wages of the men who were put on to look after them. They had gone to the other extreme now, and were charging the prepayment consumers 1s. per 1000 cubic feet more than consumers by ordinary meters; and they would certainly have to come down from that. Last year they had a balance of £188 more than they should have had. This year, he thought, they would manage to have this amount refunded, in part, to the consumers.

THE AUTOMATIC MANIPULATION OF COKE.

By Gilbert Little, of the New Conveyor Company, Smethwick.

Many a true word is spoken in jest. This truism was uppermost in my mind recently, after a discussion with Mr. Hack as to the best designs of conveyors and elevators to automatically manipulate coke. I had jocularly remarked, "I think, Mr. Hack, you and I have had the most varied experience, and made the greatest number of mistakes in connection with automatic appliances for coke; and therefore we now ought to possess the 'dear bought wit,' which should enable us to steer clear, in future, of the faults of the past." Mr. Hack made it clear, however, that he favours the view which Macaulay gives expression to in his essay on "The Effects of Progress"—that it is unreasonable and ungrateful in us to be constantly discontented with conditions which are constantly improving—as he replied, "I have no objection to your commencing your paper at the North British meeting by that jocular remark, if you will limit it, as far as I am concerned, to the words 'largest experiences;' for while you may feel justified in adding the further remark, 'made the most mistakes,' I cannot debit myself with it. I can only admit having made substantial and important improvements over my first installations of such apparatus." Well, I have formed a less contented estimate of the past in connection with coke conveying appliances than Mr. Hack; and the words of a much older historian than Macaulay, sum up not inaptly the twelve years' experience of the New Conveyor Company: "Wisdom has come through experience, and understanding through length of days." I claim, however, that we have gone on constantly improving, because there was room for constant discontent down till even a recent date.

I shall not take up any of your time describing faulty and discarded designs, but will confine this short paper to a few descriptive comments on the plans before you, as they illustrate some of the latest methods of conveying, elevating, screening, sorting, and stacking coke from moderate sized retort-houses; and the drawings could be modified to suit almost any condition of circumstances to accomplish the automatic manipulation of the coke in a large majority of gas-works.

Before asking you to follow me through figs. 1, 2, 3, 4, and 5, let me in a sentence or two refer to a few other well-known methods. The first mention is due to the arrangement at the gas-works of this flourishing city of Glasgow. You are familiar with Mr. Foulis's system of dwarf locomotives, and trains of tipping trucks—a system very suitable for exceptionally large works, and when arranged in conjunction with elevators to lift the coke, and conveyors to trim and stack it all over the storage yards, or with hoppers, a vast saving in the wear of workmen and wages must be effected.

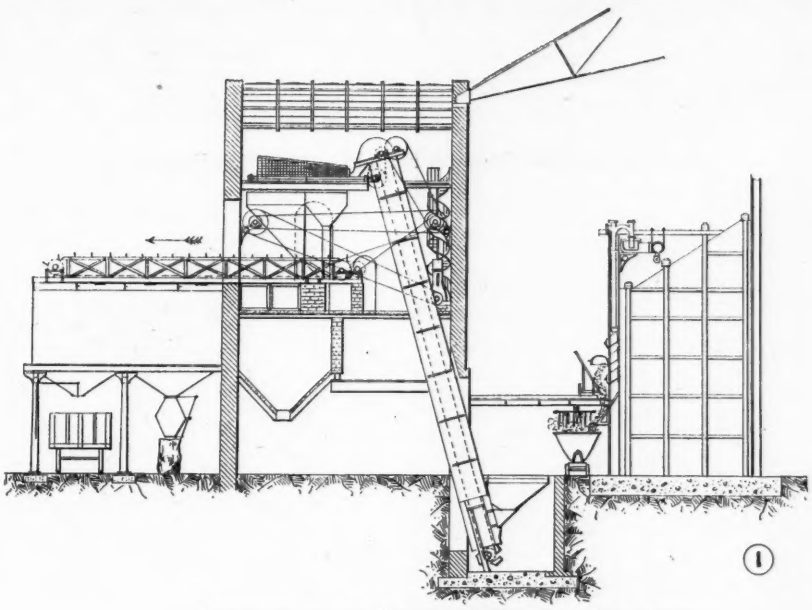
The birth of the New Conveyor Company to carry on the business of conveyor and elevator specialists occurred just prior to the opening of Glasgow's great Exhibition in 1888. We there exhibited different forms of conveyors for the first time. Since that date I have been indebted to Mr. Foulis for useful hints; and it is only right I should mention here that the satisfactory designs which we have put in to replace the "Made in Germany" appliances of coal-washing plants, were constructed similar to the elevators we supplied to the drawings of Mr. Foulis for the Glasgow Corporation Gas-Works.

Let us now cross the Border to refer to one or two coke-handling plants. In many of the English counties, there are a large number of good systems of automatic appliances manipulating the coke at ranges of coke-ovens. The time at my disposal will not admit of placing particulars of these before you; but any of you who may happen to be in the county of Durham can see the conveyors and elevators we made to the order of Mr. Bower, of West Hartlepool, to carry the coke from a bench of inclined retorts, and deliver it to the waggons on a railway siding. From West Hartlepool, it will repay you to go on to Nottingham, to inspect the elaborate coke-handling plant designed by Mr. W. R. Chester. In the gas-works at Nottingham the coke is taken hot

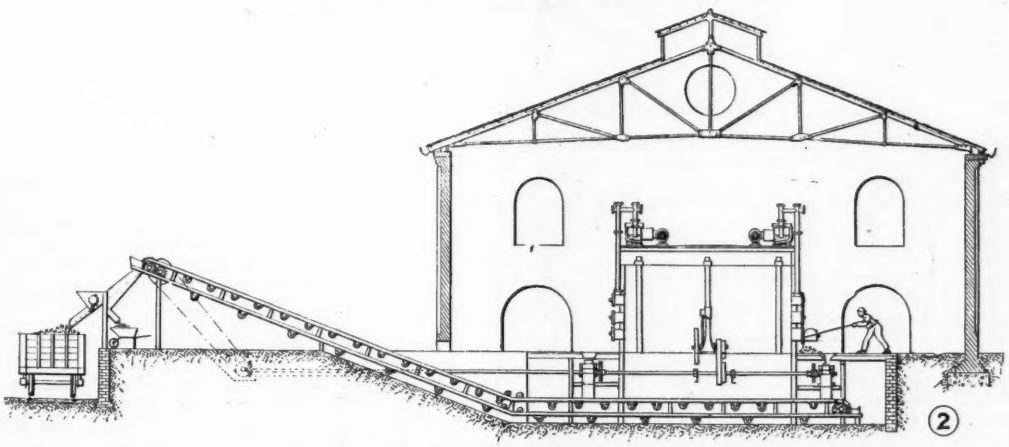
from the retorts, quenched in transit, carried into overhead hoppers, and sized ready for loading into either waggon or trucks. The arrangement also admits of the coke being automatically transferred from the hoppers, through a coke-breaker and screen, to be washed and cleansed for special trades. The machinery can deal with 300 tons of coke per day; and it sorts into five distinct sizes for the special requirements of the markets supplied by Nottingham. Altogether the automatic manipulation of coke at Nottingham reflects the highest credit on Mr. Chester and the contractors for the work. From Nottingham, it is not a "far cry" to Birmingham; so I transmit you there, where you may decide to spend a few hours at the New Conveyor Company's works inspecting conveyors and elevators in all stages of manufacture, and for every purpose. Then we go on to the Windsor Street, Saltley, or Swan Village gas-works of the Birmingham Corporation, to satisfy ourselves that progress and "push" did not cease at Birmingham when Mr. Chamberlain migrated from Municipal distinction to gain Imperial renown.

There are other coke-conveying plants over the Border too numerous to mention; so I direct your attention to the five illustrations shown. I confine myself to these five illustrations as they display sufficient variety to make it clear that one or other of them could be modified to suit almost any gas-works. A further reason for limiting myself to these drawings is the fact that I have had special opportunities of discussing, for several months, the details of these arrangements with the engineers and managers of the gas-works to which they refer—viz., Mr. Foster, at Nelson, Mr. Fenner, at Chesterton, Mr. Carr, at Widnes, and Mr. Morris, at Jersey.

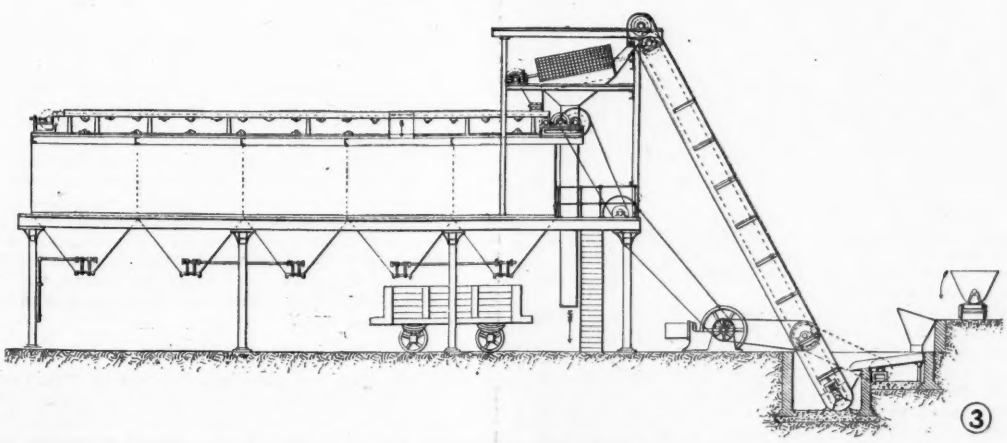
Fig. 1 shows Mr. Foster's arrangement at the Brierfield works



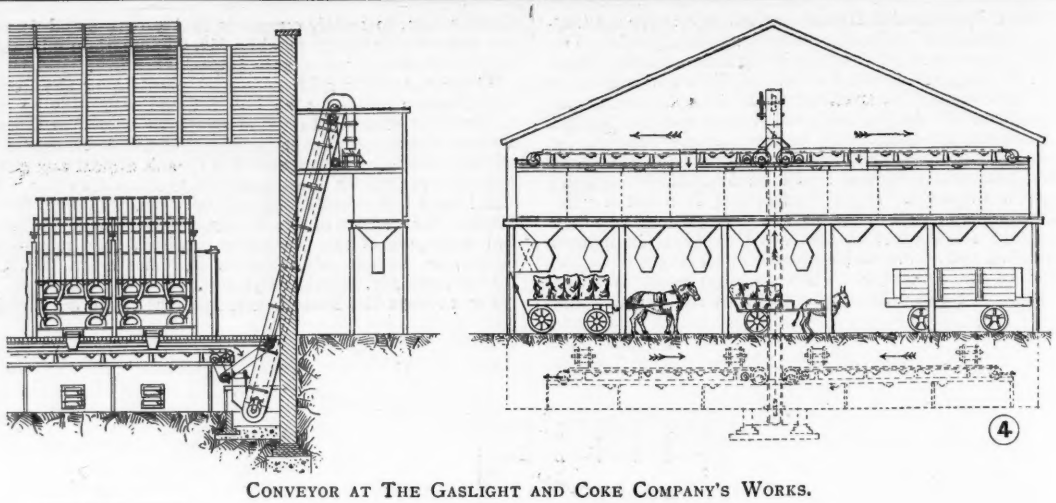
Conveyor at the Nelson Corporation Gas-Works.



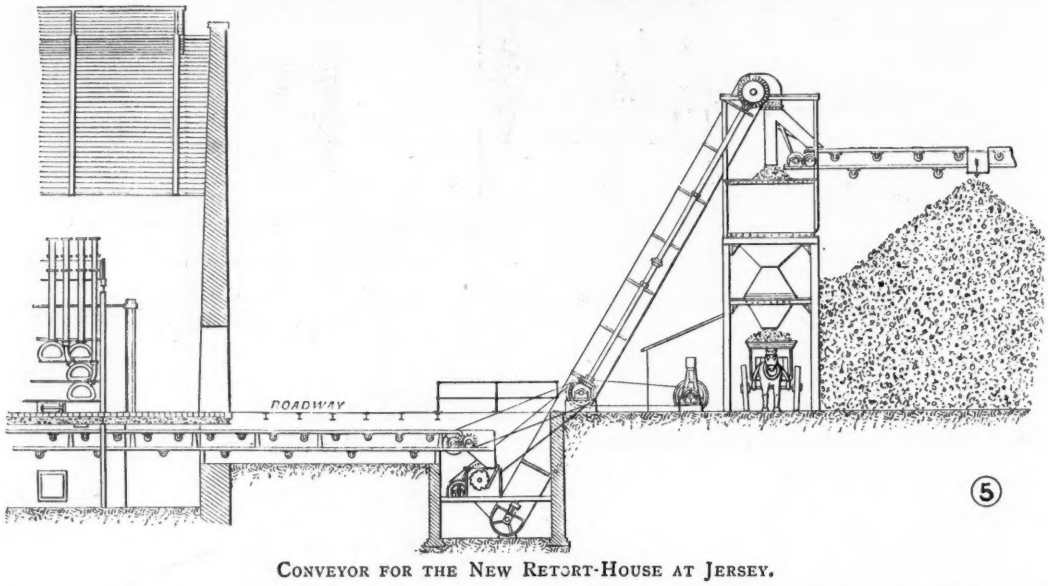
Retort-House Conveyor at Chesterton.



Coke Conveyor at the Widnes Corporation Gas-Works.



CONVEYOR AT THE GASLIGHT AND COKE COMPANY'S WORKS.



CONVEYOR FOR THE NEW RETORT-HOUSE AT JERSEY.

of the Nelson Corporation, Lancashire. We recently completed the contract there for a complete gas-works, as we were the contractors for almost everything from the weighbridge to the manager's key. The carbonizing plant is entirely automatic, from the time the coal is tipped from the waggons until the coke is distributed, as you see (from fig. 1) into the various storage hoppers. The coke slides from the inclined retorts into the tipping truck; the attendant then turns on the water, which sprays over the hot coke until it is quenched; and the truck is next moved, and the contents tipped, to be taken by the elevator to the circular screen. This screen is made to adjust so that the coke can be sized, as desired. As a rule, three sizes are made and distributed into the three ranges of hoppers. The carts or sacks are filled from the hoppers by pulling the levers to open the outlet doors.

Fig. 2 shows the arrangement for the retort-house at Chesterton. You will observe that conveyors are fixed in front of the benches; and the coke is carried from each bench of retorts by the two conveyors as shown. These, in turn, shoot the coke into the conveyor fixed at right angles, which carries it to the railway waggons. The shoot to conduct the coke from this conveyor to the railway waggons is made with screen bars, which separate the breeze, and discharge it into the shoot as shown.

Fig. 3 shows an arrangement to meet the special requirements of the coke-trade at Widnes. It is, however, suitable for a large number of gas-works; and Mr. Isaac Carr, the Engineer and Manager at Widnes, in giving his consent for this drawing to be made and put before you, wrote me as follows: "I do not know that it contains any special merit over that of any other coke plant. It is simply arranged to suit the local conditions; and that is all that can be said about it." Well, gentlemen, I could say a good deal more about its merits; but I leave the illustration to speak for itself.

Fig. 4 is an illustration of an arrangement for one of The Gaslight and Coke Company's works in East London. The retort-house is over 300 feet long, with two double benches, containing some 200 retorts. You will observe four conveyors run along the front of the four rows of mouthpieces, and convey the coke to the conveyors at the end of the retort-house, which in turn deliver it to the elevator. The elevator drops the coke on to the conveyor fixed above; and this trims it all over the storage hoppers. You will notice that measuring chambers are fixed on the bottom of the storage hoppers to fill the sacks.

Fig. 5 shows the arrangement for the new retort-house at Jersey. This retort-house (recently completed) is one of the best I have ever seen. I wrote Mr. Morris, the Engineer and Manager at Jersey, asking his permission to make and exhibit this drawing to you; and he replied as follows: "I have no objection to your showing your drawing of my retort-house; but I do not think I have any claim to have it called 'my plan.' The idea arose from our joint conversations." I had accompanied Mr. Morris to works where our coke-plants are in operation; and I also visited Jersey to see the new retort-house, and discuss the best arrangement to meet the special conditions. The result was the method shown on fig. 5. You will notice the coke is conveyed along the front of the benches under the cartway; and, passing through the coke-breaker, it is elevated to the hopper above. The delivery shoot of the elevator is made with a deflecting valve, by means of which part of the coke is delivered to the hopper, and part to the conveyor, to be delivered on the coke-stack; or all the coke can be delivered to the hopper or the coke stack. Under the large storage hopper a smaller hopper is arranged to deliver a certain weight of coke into the carts. The cart is brought under the hopper; the carter pulls the lever; and away he goes within a minute with his load.

I have given very meagre descriptions of the illustrations to you; but it will afford me pleasure to arrange for any gas manager to inspect some of our plants in Scotland. Some of our best installations of self-acting machinery are working in the town and district of the President, Mr. Wilson. In the iron and steel works at Coatbridge automatic arrangements of conveyors and elevators distributing the coal to, and taking the clinkers and ashes from, batteries of furnaces and ranges of gas producers are at work.

Discussion.

The PRESIDENT said they had listened to a valuable paper. The drawings shown were splendid, and were easily understood. If the members had any questions to put to Mr. Little, he had no doubt that he would be very pleased to answer them. He supposed their feelings would be that their works were too

small to adopt such appliances as Mr. Little had described; but there were gentlemen present who had large works.

Mr. A. WILSON (Dawsholm) said he had had great pleasure in hearing this paper on conveyors. Of course, the drawings that Mr. Little had shown would, he had no doubt, be suitable for the different works. They had the idea always that conveyors for manipulating coke were not very practicable, as there was such a great deal of wear and tear on them. So that, in the Glasgow works, Mr. Foulis had not adopted such conveyors, but had employed the narrow-gauge railway, with tipping-waggons, which they had found very suitable, and also very economical. Of course, in a great many works, small railways could not be adopted; but in the Glasgow works they answered very well indeed. They had a different arrangement for screening the coke. They did not use an elevator, but a crane with a drop bucket to raise the coke; and they screened it in this way. He had had some experience of a conveyor for the carriage of lime-shell; and the wear and tear was very serious indeed. It was not very encouraging to them to adopt it; and their present arrangement compared favourably with any of those he had seen for dealing with coke. The coke, when screened, fell down different shoots, and was directed into different places, as in the arrangement before them. Of course, each works had to adopt the best means of handling the coke to suit the place.

Mr. A. WADDELL (Broughty Ferry) said he should like to ask Mr. Little the smallest size of works in which he thought it would be advantageous to adopt the apparatus shown.

Mr. LITTLE said that in the first drawing there were only six beds in it; in the second, eight beds; and the last one had only eight beds. There were eight retorts in a bed in the last two, and six in the other.

Mr. WADDELL asked what would be the cost of the plant mentioned as applicable to the smallest works.

Mr. LITTLE replied that he knew of no place where they had so many operations to perform as at Nottingham, where the coke was separated into six sizes. This was very expensive—somewhere about £1600.

Mr. A. MACPHERSON (Kirkcaldy) said he had not the slightest doubt that, where the works were of sufficient size, there must be a considerable saving in adopting these machines. He did not know whether the apparatus would be quite suitable for Scottish gas-works; but he had no doubt they could be applied there just as well as in those in England, where they worked chiefly with coal which produced a good coke. In Scotland, on the other hand, they very often had a considerable quantity of useless coke, which came from shale and other coals of that class. But where the coke was all of one quality, he could very well understand that this plant would be of very great service. The only difficulty he could see would be where from one charge they might have good coke, and from another bad. There might be difficulty in the separation of them. Possibly Mr. Little could so arrange it that, instead of the bad coke going into the hopper it could be passed on to another, where it could be at once conveyed away without re-lifting of any description. He could quite see that the apparatus would very much facilitate the work of a retort-house; and certainly, if, as Mr. Little said, it paid to adapt it to a bench of six or eight beds of retorts, there were a large number of works in Scotland, he was quite certain, where they could afford to introduce the plant. The subject certainly was one which he never thought of; but when one saw it demonstrated, it made one think whether it would not show a considerable saving.

The PRESIDENT said he was sure they were all very much indebted to Mr. Little for bringing forward his paper. Like Mr. MacPherson, he had not considered the subject, but, now that the drawings had been put before him, and the apparatus shown thereon described, he possibly might look into the matter. He had seen the apparatus at work in his town, and it was certainly very simple and effective; and if there was anything in it, there was no reason why they should not have it. He had a very go-ahead body of Directors at Coatbridge; and if he could show to them that it would save 5 per cent., and they knew they could borrow money at 2½ per cent., they would say: "Go on with it to-morrow."

Mr. LITTLE, in reply, thanked the members for their reception of his paper. He thought that the cheaper the coke was the more reason there was for having machinery, because good coke would always pay for handling.

Sales of Shares.—Mr. A. A. Burnett recently sold at Southampton some original £10 shares in the South Hants Water Company, at £26 per share. At a sale at Bury, £4060 ordinary "A" stock in The Gaslight and Coke Company was purchased at the rate of £296¼ per cent. Ten new fully-paid £10 shares in the Glossop Gas Company were sold last Wednesday at £16 15s. each.

Cowes Gas-Works.—The Gas Committee of the Cowes District Council find they are somewhat hampered in their working by the want of capital. By their direction, the Manager and Secretary has been investigating what the requirements in this respect are likely to be during the next five years; and he finds that the total sum needed is £6682, made up as follows: Amount expended to March 31 last, £142; estimated cost of improvements and additions during the next five years, £4538; working capital, £2000. The Council last Tuesday authorized the Committee to apply to the Local Government Board for sanction to the borrowing of the £6682.

REGISTER OF PATENTS.

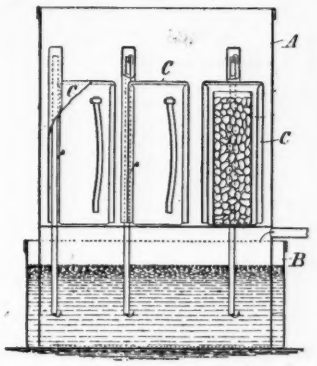
Acetylene Gas Generator.—Schülke, J. H., of Berlin. No. 10,305; May 5, 1898.

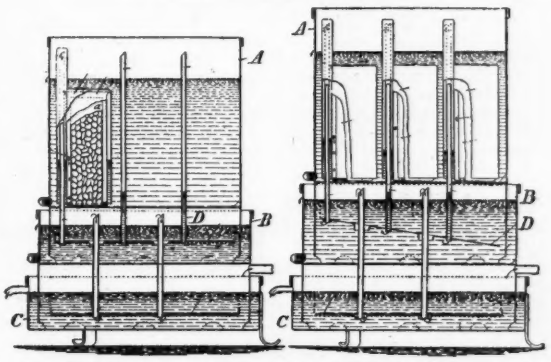
This type of acetylene gas generator is provided with only one liquid trap common to all the pipes, without there being any fear of interruptions taking place in connection with the gas pressure. The liquid forming the trap may at the same time serve for washing the acetylene gas; and in case of emergency suitable detergents—for instance, copper or iron vitriol—may be dissolved in the liquid.

Fig. 1 shows an apparatus with the ordinary liquid trap. Figs. 2 and 3 show modifications, having several liquid traps arranged beneath each other.

Any number of generators may be inserted into one common receptacle A, which is open above, and whose walls extend beyond the bottom and enter into a liquid receptacle B. Each generator consists of a carbide chamber inserted into a vessel open above. A bell is provided above the latter, which communicates with a pipe in which the delivery-pipe enters, and is tightly passed through the bottom of the receptacle A, and extends with its lower ends below the water level of the receptacle B.

In fig. 1, only one water trap is provided; but two or more such traps may be arranged, as shown in figs. 2 and 3.





In these latter, the walls of the receptacle B extend below, and enter a chamber C. Through the bottom of B are pipes tightly passed, whose upper end enters the chamber above the water level of B, and whose lower end immerses into the water contained in C. In order to extend the way which the acetylene gas must take through the water, plates or walls D (with their edges turned downwards) are preferably arranged at the lower ends of the pipes, and the acetylene bubbles pass along the plates or walls, whereby their cleansing action is increased. The water inlet openings of the carbide receptacles are preferably arranged stepwise, at different heights, whereby the carbide receptacles operate successfully.

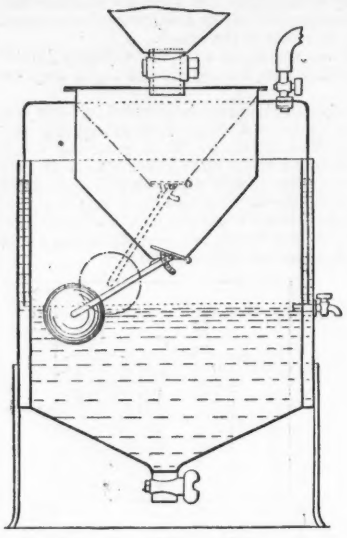
In order to set the apparatus in operation, the carbide receptacle with the lowest inlet opening is first placed upon the delivery-pipe, so that water passes in, and generation of acetylene is effected until such a pressure is attained that the water is pressed out of the bell. The remaining generators are then put on to each delivery-pipe individually. Since, however, the water cannot rise to the inlet openings of these generators, which lie higher than those of the first-mounted generator, the generators which are put on last cannot operate until the first generator is completely exhausted. Thereupon a decrease of pressure takes place; so that the water passes to the next higher inlet opening. In order to attain this result with safety, the delivery-pipes may preferably be also of various lengths, in such manner that the pipe corresponding to the generator with the lowest inlet opening is the shortest, and the delivery tubes of the remaining generators longer, according to the height of their inlet openings. Such an arrangement is shown in fig. 3.

Automatically Supplying Carbide of Calcium to Acetylene Gas Apparatus.—Kieffer, F. A., of Paris. No. 20,142; Sept. 1, 1897. Date claimed under International Convention, Feb. 4, 1897.

This invention relates to apparatus for the automatic supply of carbide of calcium in an acetylene gas-generator proportionately to the consumption—consisting essentially of a closed container for the carbide supported within the bell of a gas-generator, and provided at its lower part with an outlet controlled by a valve whose opening and closing are dependent on the fall and rise respectively of the carbide container in the tank.

As shown next page, the container is mounted in the crown of a bell, which dips into an annular water seal contained between the outer and inner walls of a hopper-shaped tank at bottom, and provided with a discharge outlet and cock for the spent carbide, and with a cock at the side

for regulating the level of the water within the tank. The carbide container has a hopper-shaped bottom, provided with an outlet closed by a flap valve acted upon by a float, the arm of which is hinged to the valve, and is adjusted rigidly in position relatively to it by being pinned to a quadrant, so as to regulate the extent of its opening. The container is hermetically closed by a cover, and may be surmounted by a supply hopper capable of being put in connection with the container by a cock for supplying the carbide to the container as the operation proceeds.



The action of the plant is as follows: Water having been filled into the tank until it runs out at the side cock (which is then closed), a sufficient quantity of carbide in small pieces is filled into the container. The float resting at the surface of the water, the valve is raised, and the carbide falls into the water. The acetylene generated raises the bell and container until the float, being no longer supported by the water, allows the valve to close, and thus for the time cut off the supply of carbide. As the acetylene contained in the bell is delivered for consumption through the pipe at the right-hand top of the bell, the latter descends along with the carbide container until the action of the float opens the valve so as to allow a small quantity of carbide to drop into the water. A fresh evolution of gas then takes place, after which the bell again rises and the valve closes, and so on—a supply of carbide proportionate to the consumption of acetylene being thus automatically ensured.

APPLICATIONS FOR LETTERS PATENT.

16,156.—Halls, W. C. & C. W. G., "Incandescent gas-burners." July 25.

16,176.—Meischke-Smith, W., "Supporting incandescence mantles." July 25.

16,227.—Bennett, J. F., Moorwood, T. P., and Moorwood, H. S., "Gas and oil engines." July 26.

16,234.—Moss, R. J., "Generation of acetylene." July 26.

16,266.—Engelhardt, A., "Manufacture of gas." July 26.

16,317.—Moore, W. N., and Karr, J., "Acetylene gas lamps." July 26.

16,366.—Bilbie, J., and Drivet, H., "Acetylene generators or lamps." July 27.

16,380.—Smith, W. B., "Application of the mechanical energy of gas and other engines to motor cars and for other purposes." July 27.

16,387.—Kirsten, P., "Indicating deficiency or stoppage in the flow of fluid through pipes or the like." July 27.

16,392.—Biheller, S., "Producing gas from calcium carbide." July 27.

16,457.—Berger, H. R., "Generating acetylene gas in a pure state." July 28.

16,470.—M'Lean, A., "Tar pavements." July 28.

16,479.—Williams, R., and Clarke, J. H., "Acetylene gas generators." July 28.

16,487.—Legge, J. St. Clair, "Acetylene gas generator and purifier combined." July 29.

16,546.—Howard, C., "Incandescent burners." July 29.

16,559.—Williams, R., "Generation of acetylene." July 29.

16,571.—Ferron, C. A., "Gas-burners for incandescent lighting and for heating purposes." July 29.

16,578.—Daubenspeck, G., "Incandescent mantles." July 30.

16,613.—Testelin, C., and Roseaux, C., "Generating and burning acetylene gas." July 30.

16,634.—Schmidt, C. V. G., "Generation and regulation of acetylene gas in lamps." July 30.

16,670.—Bohndel, H. H., and Yeaton, C. C., "Production of gas for illuminating and other purposes." July 30.

16,672.—Lecomte, A., and Loeser, I., "Regulating the pressure of, and distributing gas." July 30.

The Matchless Gas Lighting Syndicate, Limited, has been registered with a capital of £12,000, in £1 shares (3000 deferred), to carry on the business of a gas company in all its branches.

Rhondda Gas and Water Works Extensions.—Mr. Robert H. Bicknell, of the Local Government Board, attended at the Pentre Council Chambers last Tuesday to receive evidence relative to applications made by the Rhondda District Council for sanction to borrow £9500 for gas-works purposes, and £500 for the water-works. The Clerk of the Council Mr. W. H. Morgan), the Gas and Water Manager (Mr. Octavius Thomas), and others gave evidence.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Mr. Grafton on Photometric Standards.

Sir,—I agree with Professor Harcourt, whose letter appeared in the last issue of the "Journal," that 3 cubic inches of pentane of sp. gr. ·630 to ·631, as used in my experiments, will volatilize in the open; but in making the air-gas in a holder, the air is not subject to movement, and stratification takes place, particularly at low temperatures. Consequently we do not get a homogeneous mixture of air and pentane vapour. I thank Professor Harcourt for drawing my attention to the error "3 oz.," which should read "3 cubic inches" (see *ante*, p. 150). The pentane employed in the experiments satisfied the usual tests as to quality. I fail, however, to see the object of his criticism in this respect, considering that he once wrote "that an air-gas of the same illuminating power is obtained with samples varying in specific gravity between ·614 and ·645."

I cannot support Professor Harcourt when he says "that the argand burner flame, with its tip screened off, is equally bright" independent of the percentage of pentane vapour in admixture with the air used as a carrier. It all depends upon what time (after lighting the burner) the comparison is made, as to what will be the result. I was one of the first, if not the first, to prove that this "equally bright" was not absolutely a fact; and for the other experimenters' sake it is a pity the experiments are on record to which the Professor alludes.

Professor Harcourt has considerably altered in his opinion of the Dibdin standard during the last year or so; for he admits that "unexpected irregularities, too large to be neglected" (see "Journal" for June 28, p. 1552), have been observed, and which are not wholly due to the glass chimney. This is borne out by the Gas Referees' recent action in notifying their intention of replacing the candles, not to speak of the Dibdin standard, by the Harcourt 10-candle lamp. In my experiments, the same chimney was used throughout, and in one particular position.

Professor Harcourt will find, by reference to the "Journal," that I have made my case out in detail that the Dibdin 10-candle standard is not as represented to be—*i.e.*, it is not equal to 10 average sperm candles; that the length of the flame cannot be altered without affecting the power of the standard; and that the standard light is seriously affected by the percentage of pentane vapour in the air, &c. Such and other questions have been settled to the detriment of the Dibdin standard, since it is shelved by the 10-candle lamp for the time being. A careful operator, possessing a pair of impartial eyes, can easily prove the truth of my figures now on record.

Beckton, Aug. 5, 1898. W. Grafton.

Profit Sharing.

Sir,—I should like to induce the chairmen, engineers, managers, and foremen of gas-works, to contribute their ideas on, and their experience of, profit-sharing among workmen. I have read the reports you have published on the Livesey and the Richmond systems, also your able leaders on this subject, as I have for a number of years been keenly interested over a system of profit-sharing, and have had hopes of being able to formulate a scheme by which each man and boy (from the manager to the gate-boy) would be paid a share of the profits earned commensurate with his worth in the works. Like the Old Age Pension Committee, I am not able to devise or suggest a system to work practically, or one likely to be a source of anything but dissatisfaction. Whatever system might be adopted the lazy and incapable would still get a share of profits which they had not honestly helped to create.

Therefore for the time being I have dropped the idea of introducing a system to give all our workers a share of the profits, and have introduced a more limited arrangement, whereby all the heads of departments will participate in the profits earned during the next financial year of our Company. Our system is to pay a share of the profits to the secretary, chief-draughtsman, foreman engineer, foreman plater and riveter, foreman pattern-maker, foreman millwright, and also to all our foremen in the iron and retort-bench departments erecting the contracts all over the country. Already we see some satisfactory improvement. The work is done better; fewer mistakes are made; and far more pride is taken in keeping the workshops tidy and the machines in good condition. The various heads of departments appear to feel they now have a far greater interest in the works; they consult freely and fully with each other about the routine in which their respective parts of the contracts are to be dealt with; and with the short experience we have had of this limited system of profit-sharing, there has been such careful and interested attention given to the finishing and despatching of orders that complaints by myself or our buyers show a gratifying decrease.

I regret we did not see our way to a wider application of a profit-sharing system in our works, but I hope not only the chairmen, directors, engineers, and managers of gas-works, but the intelligent and studious working-men, will put their views, suggestions, and experience on this question before the readers of the "Journal," as it cannot but be conducive to the interest of all to ventilate a subject which many think the most likely solution of capital and labour difficulties.

Smethwick, Aug. 6, 1898. Gilbert Little.

Reductions in Price.—The Stockport Town Council last Wednesday adopted a recommendation of the Gas Committee that a reduction of 1d. per 1000 cubic feet be made in the price of gas to consumers outside the borough, making the differential rate 4d., as against 5d.; also a reduction of 2d. per 1000 cubic feet both to inside and outside consumers paying their accounts early—the reductions to come into force on the September rental. The amount previously allowed for prompt payment was 2½ per cent.; and the proposed allowance is equal to rather more than 5 per cent. The Directors of the Wickham Market Gas Company propose to reduce the price of gas from 7s. 1d. to 6s. 8d. per 1000 cubic feet, from Oct. 1 next. In 1874 the price was 10s.; in 1876, 9s. 2d.; in 1878, 8s. 4d.; and in 1880, 7s. 1d., at which price it has since remained. The Lambourn Gas Company have reduced their price to 7s. 1d. per 1000 cubic feet as from the 1st ult.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bill reported, with amendments: St. Helens Corporation Bill.

Bills read the third time and passed: Keighley Corporation Bill, Paignton Improvement Bill, St. Helens Corporation Bill, Wey Valley Water Bill.

Bills Royal Assented: Clacton Gas and Water Bill, Coventry Corporation Gas Bill, Gaslight and Coke Company (Capital Consolidation) Bill, Leyton Urban District Council Bill, Maldon Water Bill, Middlesbrough Corporation (Gas) Bill, Southampton Gas Bill, Tynemouth Corporation Water Bill, Water Orders Confirmation Bill.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills read the third time and passed: Carlisle Corporation Water Bill, Filey Water and Gas Bill, Forres Water Bill, Heywood Corporation Water Bill, Newcastle-upon-Tyne and Gateshead Water Bill, Rochdale Corporation Water Bill, Todmorden Corporation Water Bill, Wath-upon-Dearne Urban District Council Bill.

Bill withdrawn: Bury Corporation Bill.

HOUSE OF COMMONS COMMITTEES.

At the close of the proceedings on the Cranbrook District Water Bill (as reported in the "JOURNAL" for July 26) the Committee presided over by Sir Charles Dalrymple proceeded with the consideration of the

HIGHAM AND HUNDRED OF HOO WATER BILL.
MID-KENT WATER BILL.

Under the first of these Bills, the Higham and Hundred of Hoo Water Company sought, by an amendment of section 4 of their Act of 1890, an extension of the time during which they might supply water in certain parishes of their district, from seven to ten years. The application was opposed by the Mid-Kent Water Company, who alleged that the Higham and Hundred of Hoo Company had allowed their powers to lapse, and that they could not efficiently supply the districts in question. The Mid-Kent Company also asked that the Act of the Higham and Hoo Company, so far as it related to the parishes in question, should be repealed.

Mr. Edward Boyle appeared for the promoters; Mr. Pembroke Stephens, Q.C., and Mr. R. Saunders, for the Mid-Kent Company; and Mr. Ram, for the Maidstone Rural District Council.

In opening the case, Counsel for the Bill said that the Higham and Hundred of Hoo Water Company were incorporated by Act of Parliament in 1890, to supply an area which included, among others, the parishes of Cuxton, Cobham, Meopham, and Luddesdown. The Act defined the area which the Company should supply, and provided that, if in any parish within their limits the Company should not have made adequate provision for the supply of water within seven years from the passing of the Act, the restriction on the construction of water-works by a Local Authority imposed by section 52 of the Public Health Act, 1875, should not in respect of the Company apply to or be binding on the Local Authority (as defined by that Act) of any such parish. The Company had not supplied the parishes of Cuxton, Cobham, Meopham, and Luddesdown. Really the only thing asked for in the Bill was that they should have ten years, instead of seven, within which to carry out their obligations. Paragraph 2 of the present Bill read: "Section 4 of the Act of 1890 is hereby amended, by substituting the words 'ten years' for the words 'seven years' in the proviso to the said section mentioned; and the said section shall be read and have effect accordingly." The seven years given under the Act of 1890 expired last July. In effect, therefore, the Company were now only asking for a further two years. The only petition against the Bill was that of the Mid-Kent Water Company. After referring to clause 2 of the Bill, the petition stated that the Mid-Kent Company were prepared to prove that they could provide a much greater amount of accommodation, so far as the supply of water was concerned, to the four parishes in dispute than could be given by the Higham and Hundred of Hoo Company; that the Mid-Kent Company's works were within 200 or 300 yards of the parish of Cuxton, while those of the Higham Company were several miles away; that the levels of the latter Company were not such as to permit them to adequately supply the four parishes mentioned; and it wound up by asking Parliament to take them away from the Higham Company and give them to the Mid-Kent Company. The Higham and Hundred of Hoo Water Company was a growing little concern, which had been fairly successful. Last year they earned 3 per cent. on their capital, and paid 2 per cent. to the shareholders. There were no debentures or preference shares; and they had the money to meet a temporary loan of £500. The Company therefore regarded the attempt of the Mid-Kent Water Company—only a limited company—to take away from them powers which had been conferred by statute, as little short of impertinent. They were prepared to show that they could, and were willing to, supply Cuxton, Cobham, Meopham, and Luddesdown districts far better than the Mid-Kent Company could do. If the desire of the latter Company were granted, it would mean that the shareholders of the Higham and Hundred of Hoo Company were not to have the opportunity of securing the fruits of their investment. So far from the Local Authorities, who at present had the power to supply their own districts, being opposed to the Bill, they were in favour of it.

Evidence was then called to show that the Hoo Rural District Council, the Frindsbury Rural District Council, and the Meopham Parish Council supported the Bill, and that the Company had been well managed. In answer to the Chairman, as to why the Higham and Hundred of Hoo Company had allowed their powers of supply over the four parishes in question to lapse, the Chairman of the Company (Mr. Anderson) said that the Company had desired to proceed cautiously in extending their works. Mr. V. Domenico de Michele and Mr. W. Coles Finch, Engineer of the Brompton, Chatham, Gillingham, and Rochester Water Company, gave evidence as to the practicability of the Higham and Hundred of Hoo Company supplying the disputed parishes by the construction of a new reservoir within their district.

Mr. Pembroke Stephens submitted that the Higham and Hoo Water Company had placed themselves out of Court by their admission that they had allowed their powers to lapse; but the Chairman decided to go on with the Bills in the ordinary way. Mr. Pembroke Stephens then opened the case for the Mid-Kent Company, which he said was formed in 1888, under a Provisional Order, with a capital of £18,000 and proportionate borrowing powers. Unlike other companies in the locality, the Mid-Kent Company had supplied their area, and were now supplying 19,000 persons out of a total population in their limits of supply of 21,000. The recent epidemic in Maidstone, which was close to their district, had had a very important bearing on the Mid-Kent Company. The town applied to the Mid-Kent Company for a supply; and so urgent was their necessity, that though three or four miles of main, he believed, had to be laid, the supply was actually available in Maidstone within a week. It was true that the Company had no express statutory powers to do this; but it was done on the principle on which one threw a rope to a drowning man. The supply had been continued; and Maidstone had asked that it might be increased. Since the Company's first Provisional Order, others had been obtained; and the Company now felt, in view of the supply to Maidstone and of other circumstances in the district which called for a re-arrangement of the existing statutory divisions, that they were justified in coming to have their Provisional Orders fused into one Act, and that further powers should be granted to them for the extension of their works and area of supply, and for an increase of capital. The Company so far had raised and spent £33,000, which they proposed to call original capital; and they now sought power to raise a further £87,000 for the works mentioned in the Bill, and for future working capital. The existing works of the Company consisted of a pumping-station and three reservoirs; and the additional works contemplated were a pumping-station near the existing well, a reservoir at Birling, a rising main connecting the well and reservoir, and another reservoir at Wrotham on the very highest point in Kent, so that from this point it would be possible to supply the whole of the district they sought power over. The only point in dispute between the two Companies was as to which was to supply the parishes of Cobham, Cuxton, Luddesdown, and Meopham, which were within the Higham and Hundred of Hoo Company's present district. The other parishes to which it was sought to extend their powers of supply, included Mereworth, West Peckham, Waterinbury, and Teston, which had been part of the district of the South Kent Company, but were conceded to the Mid-Kent Company in consideration of their agreeing to give the South Kent Company a supply of water in bulk for the rest of the district they retained; Nettlested, Marden, Yalding, and Staplehurst, which the Maidstone Rural Authority had agreed to let them supply; and Smarden and Bethersden, where also there was no opposition. With regard to Nettlested, Marden, Yalding, and Staplehurst, the Company had agreed that the supply should be given within eighteen months from the passing of the Act, on pain of losing their power there. The extraordinary thing about the Higham and Hoo Company and the four parishes in dispute, was that the Higham and Hoo Company had allowed the period within which they might supply expire. Yet they were now seeking to revive this power by extending the original period from seven to ten years. The Higham and Hoo Company said they had the support of a number of Local Authorities; but the favour of the Local Authorities seemed to be due to the fact that the term within which the supply must be given was in the Bill of the Higham and Hoo Company three years, whereas in the Mid-Kent Company's Bill it was six years. The period in the latter Company's case had, however, been altered to eighteen months, so that if there was anything in the argument of the Local Authorities, the Company should have their support.

Sir Sidney Waterlow, a large landowner in Meopham and Wrotham; Mr. P. S. Knaggs, a member of the Parish Council of Meopham; and Mr. R. Green, Chairman of the Wrotham District Council, were called in support of the Mid-Kent Company's case, and gave evidence as to the necessity for water in the various parishes referred to. The feeling seemed to be that they cared little which Company were authorized to supply so long as water was made available; but that seeing the Higham and Hoo Company had not exercised their powers in the four parishes for seven years, it would be better to give authority to supply these to the Mid-Kent Company. In the course of cross-examination, Mr. Boyle stated that the height of the proposed reservoir of the Higham and Hoo Company was 680 feet above sea-level, and that no portion of the four parishes was so high.

Eventually, on Mr. Boyle for the Higham and Hoo Company undertaking (in reply to the Chairman) to commence the work of supplying the parishes within three months of the passing of the Act, and to actually supply within eighteen months, the Chairman said the Committee found the preamble of the Higham Bill proved; the undertaking being embodied in the finding as a condition. The preamble of the Mid-Kent Bill was also found proved, except so far as it was affected by the foregoing decision.

The clauses were adjusted at a subsequent sitting of the Committee.

HASLEMERE DISTRICT WATER AND GAS BILL.
WEY VALLEY WATER BILL.

These two partially competing schemes were taken together. The object of the Haslemere Bill was to enable the promoters to acquire the undertaking of the Haslemere Gas Company, Limited, and to supply with water and gas a large district which includes Haslemere, Chiddingfold, Shottermill, Thursley, and Frensham, in Surrey; Linchmere, Fernhurst, and other places, in Sussex; and Branshott, Liphook, &c., in Hants; as well as parts of Peter Harrow, Godalming Rural District, not in the limits of supply of the Frith Hill, Godalming, and Farncombe Water Company, Limited. The Wey Valley Company sought power by their Bill to supply with water a district including Haslemere, Hindhead, Bramshott, Liphook, Thursley, Seale, Hale, Bentley, and Benster.

Mr. Pember, Q.C., Mr. Balfour Browne, Q.C., Mr. Wedderburn, Q.C.,

and Mr. Hans Hamilton appeared for the Haslemere District Water and Gas Company; and Mr. Littler, Q.C., Mr. Horatio Lloyd, and Mr. E. Charteris, for the Wey Valley Water Company. The petitioners against the Haslemere Bill who were represented were the Hambledon Rural District Council, by Mr. Blennerhassett, Q.C., and Lord Robert Cecil; the Farnham Rural District Council, by Mr. Castle, Q.C.; and Messrs. Jonathan and H. Hutchinson, by Mr. Garrett.

The water provisions of the Haslemere Bill were first dealt with. Mr. Pember, in opening, said he believed that neither set of promoters knew that the competing Bill was being brought forward until it appeared; and he expressed the opinion that some arrangement might be possible between the two Companies, under which the district in dispute might be divided between them.

Professor Jonathan Hutchinson, who was the first witness called, said that he had a residence and owned some land and houses at Haslemere. He had made water-works for his own houses, and was prepared to hand them over on terms to the Haslemere Company. This would enable the Company to at once supply the whole of Haslemere town with good water. The Hambledon Rural District Council, which was the Local Authority of Haslemere, had put up some stand-pipes for use by the people. The District Council, however, who opposed the Bill because they said there was no necessity for an additional supply, had refused to allow him to occupy one of his houses on the ground that it had no water; the nearest stand-pipe being too far off.

Mr. G. B. Holroyd, Managing-Director of a Brewery Company having several licensed houses in the Haslemere district, stated that he was one of the promoters of the Bill. He had received constant complaints from his tenants in the district of the inefficient character of the present water supply. In his opinion, the stand-pipes in Haslemere were not sufficient for the purpose for which they were designed.

The Committee having decided to take evidence respecting gas, as well as water supply from the local witnesses, Mr. Holroyd stated that gas was supplied in Haslemere by a private Company who had no statutory powers or responsibilities; but there was no supply of gas whatever in Hindhead and Shottermill. He thought it most desirable that a statutory company should be authorized to supply gas in the district.

In cross-examination, witness denied that the supply of gas by the Company would probably cost a considerable burden on the water consumers, and said it was not proposed to lay down gas-mains throughout the whole of the 200 square miles included in the Company's district. Gas powers were taken for the whole of the district because it might be desirable later on to exercise these powers. Mr. E. O. Preston was one of the promoters of the Bill. Witness was not aware whether he was the Mr. E. O. Preston who advertised as follows in the "Law Times":

To Parliamentary Agents and Solicitors.—A capitalist desirous of promoting Acts of Parliament in approved districts not now adequately supplied with water, is willing to pay a good bonus for the introduction of such business, or would purchase existing Acts of Parliament.—Apply E. O. Preston and Co., 4, Tokenhouse Buildings, London, E.C.

Mr. R. Storr, of Haslemere, stated that he was a property owner in the district, and expressed the opinion that the object of putting up the stand-pipes in Haslemere had been to prevent the introduction into the district of a proper water supply. He was strongly in favour of the Bill, as he thought that a good water supply was highly desirable.

Mr. F. W. King, owner of the White Horse Hotel, Haslemere, also spoke of the inadequacy of the water supply, and said that the local charge for gas was 4s. 7d. per 1000 cubic feet, with 5s. a quarter meter-rent. On Good Friday last, the pressure was so low that it was necessary to illuminate the hotel with lamps and candles.

Mr. Charles Charwood and Mr. W. A. Harris, both of Haslemere, having given evidence on the water question,

Mr. Herbert Hutchinson, son of Professor Hutchinson, said he was an architect and builder, carrying on business at Haslemere and Hindhead. He spoke of the water-works on his father's estates. He stated that several people in the neighbourhood had taken the water provided by his father in preference to that which they could obtain from wells or the stand-pipes. His father had built a house on Museum Hill, Haslemere; and the Hambledon District Council had at first refused to let it be occupied, on the ground that there was no adequate water supply. He believed that by purchasing his father's water-works, the Haslemere Company would obtain an ample supply for Haslemere and Shottermill. The gas-works at Haslemere were by no means adequate; and the advent of a Company to supply Haslemere, Shottermill, and the surrounding districts with gas, would be a boon to the neighbourhood, and would, he thought, be so considered by the inhabitants. In cross-examination, witness said he did not know whether it was necessary to supply gas as far away as Frensham—seven or eight miles off.

Mr. A. W. G. Harding, builder, of Shottermill, gave evidence as to the inadequacy of the present water supply at Shottermill. The water was, he said, mostly from wells, but part was fetched in buckets from springs. In some of the wells, the water was not fit for drinking purposes; and it was therefore necessary to use the spring water. The people in the district were anxious to have a proper water supply; and they would, he believed, like a good gas supply if they could obtain it at a reasonable price.

Some further evidence having been given in support of the water provisions of the Bill, Mr. Joseph Quick, Engineer to the Haslemere Water and Gas Company, expressed the opinion that it was highly desirable to have a proper gas supply introduced into the district. The proposed new gas-works, he said, were in a suitable position, well away from all buildings. In cross-examination, witness said he was not aware whether any of the promoters of the scheme had an interest in the district, except Mr. Holroyd. He did not think that any agreement had been come to at the present time for the purchase by the Company of the existing Haslemere gas undertaking; and he had formed no estimate of what it would cost. He did not know what was the condition of the existing gas-mains.

The Committee intimated that they did not want to hear any more evidence respecting the gas provisions of the Bill; and the promoters thereupon closed their case.

Mr. Blennerhassett said that, as the Hambledon Rural District Council opposed both Bills, he proposed to reserve his remarks until the Wey Valley case had been heard.

Mr. Castle addressed the Committee for the Farnham Rural District Council; strongly supporting the Wey Valley scheme, and opposing that of the Haslemere Company.

Evidence was next called on behalf of the Wey Valley scheme.

Mr. A. C. Payne, of Frimley, said he was Chairman of the Frimley and Farnborough District Water Company, and one of the promoters of the Wey Valley scheme. The Wey Valley Company's Bill included unopposed provisions promoted by the Frimley and Farnborough Water Company, and the Farnham Water Company, authorizing the extension of their areas and the increase of their capital. Witness explained the proposed works of the Wey Valley Company; stating that there was to be a well and pumping-station north of Crondal, and two wells and pumping-stations on Hindhead. He contended that the Hindhead water ought to be used for the supply of the people in that district, and should not be diverted into Sussex as proposed by the Haslemere Company. The Sussex people might get a supply from the hills south of the county boundary.

At this point, Mr. Pember stated that a compromise had been arrived at between the two Companies. With reference to the gas proposals, the Haslemere Company had undertaken not to supply the northern part of Frensham; and as to the rest, the Rural District Council of Frensham had ceased to oppose them With regard to the water supply proposals, the Haslemere Company had agreed to leave to the Wey Valley Company Headley and Shottermill. Each Company, said the learned Counsel, would thus take a share of the cream and some of the milk.

Mr. Lloyd remarked that all the Hambledon district (which includes Haslemere) would under the arrangement be included in the Haslemere Company's area, and not in that of the Wey Valley Company. It had been arranged that the latter Company should supply the Haslemere Company with water in bulk from Hindhead, for the high parts of the Haslemere Company's area; and that for the other portions of the area Professor Hutchinson's water should be used.

Evidence was then given on behalf of the Hambledon District Council, who had not entered into the arrangement. Among the witnesses called was Sir Robert Hunter, Chairman of the Haslemere Parish Council, who stated that the larger houses in Haslemere were supplied with water from their own wells; and it was only in the village itself that any question of water supply arose. The well water supply was perfectly satisfactory; and, in his opinion, Haslemere was abundantly supplied. To provide the more thickly populated part of the parish with water, there were now sixteen stand-pipes. From these plenty of good water could be obtained. The sources of supply, so far as the stand-pipes were concerned, were vested in the Parish Council; but a condition had been made by the owner of the land in which the springs were situated that the authority to use the water should become void if any company obtained statutory powers to supply the district. Therefore, if this Bill passed, the Local Authorities would have to give up the supply of water; and this would be a very serious loss to the people of Haslemere. There was at present no water-rate, so called, in Haslemere; but the sanitary rate had to pay for the cost of pumping. Roughly speaking, this amounted to £50 a year, which was practically 1¼d. in the pound. The main objection to the Haslemere Company's Bill was that if it were passed, the District Council and the Parish Council would lose the control of the water supply, and largely that of sanitation. The Council objected to any Company acquiring statutory powers to supply gas in their district, just as they did with respect to water, as they did not for ever wish to lose the control of both the gas and water supply.

Dr. Hall, Medical Officer of Health for the Hambledon Rural District, said he was satisfied with the water supply of Haslemere, and with the progress that was being made in the district in sanitation generally. He thought the Hambledon District Council might be relied on to make any improvement that was needed. Between 1894 and 1897, he had not been able to trace one death to faulty water supply. In cross-examination, however, witness admitted that he had every year called attention to the necessity of improving the water supply.

Mr. Blennerhassett contended that the supply of gas, as well as of water, should be in the hands of the Local Authority. He admitted that the Hambledon District Council had not attempted to supply themselves with gas up to the present, but pointed out that they might do so at any time; and he said they ought not to be deprived for ever of the opportunity of doing so by the transfer of the present local undertaking to the new Company. The Council took up a similar position with regard to the water provisions of the Bill. Counsel remarked that Mr. Preston, one of the promoters of the Haslemere Water and Gas Company, was a speculative purveyor of water, a buyer of parliamentary powers, and a stranger to the district. He must be looked upon as a mere speculator, entering into the scheme for the purpose of making money out of it. The other promoters were in much the same position; and, in view of the opposition of the Local Authorities, the Hambledon District Council submitted that the Haslemere Bill ought not to be passed.

The Committee decided that the preamble of the Haslemere Bill was not proved. With reference to the Wey Valley Bill, they thought the preamble proved as far as the portion of the area in the neighbourhood of the town of Farnham was concerned—the water to be supplied from the Crondall source—and also as regarded the proposed extension of the limits of supply and new powers to be given to the Frimley and Farnborough and the Farnham Water Companies. They announced their intention of throwing out the portion of the Bill relating to the supply of the Shottermill district and the use of Hindhead water.

Mr. Lloyd and Mr. Castle both protested respectfully against the rejection of the Shottermill portion of the Wey Valley scheme, on the ground that they had not called all their evidence regarding it, in view of an intimation from the Committee that they did not wish to hear any more. The Chairman said the Committee thought they had heard enough evidence to form the conclusion which had been announced; but they were willing to hear any more which Counsel might think it was desirable to tender.

Some further evidence was then given, including that of Mr. E. K. Burstal, who stated that the only practically available source of supply for Bramshott, Shottermill, &c., was Hindhead. Witness said that this portion of the scheme had large local support.

The Committee, having again considered the matter, altered their former decision, and passed the scheme of the Wey Valley Company as regarded Shottermill, Bramshott, Liphook, and Headley, and the obtaining of a supply of water from wells at Hindhead.

LEGAL INTELLIGENCE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Thursday, Aug. 4.

(*Before the* MASTER OF THE ROLLS *and Lords Justices* CHITTY *and* COLLINS.)

Fielden v. Mayor of Morley.

This was an appeal by the plaintiff from the order of Mr. Justice Byrne, made on the 28th of April, and reported in the "JOURNAL" for May 3 (p. 1015), dismissing the action, which claimed an injunction restraining the defendants from obstructing a certain catchwater, or in any way causing or allowing water to collect and flow on the land of the plaintiff. At the conclusion of the arguments, on the 19th ult., their Lordships reserved judgment, which was delivered to-day.

The MASTER of the ROLLS said the real question was whether the defendants were entitled to send water from their aqueduct on to the plaintiff's land, making good any injury caused, or whether they were bound not to send any water on to his land. The defendants had made a bye-wash in the side of the aqueduct, to allow the storm water to escape through a natural gully; and the plaintiff contended that they had no right to do this in such a way as to allow water to come on to his land, though it was admitted that the usual and proper mode of providing for storm water was to make such outfalls as the one complained of, and that no better spot could have been selected for it with the view of doing the least possible damage to the adjoining land. The outfall was constructed under the powers of the Morley Corporation Water-Works Act of 1890; and the Court would not interfere on the ground that it might have been differently constructed or put in another place. If damage was done to the plaintiff's land, his remedy was by action for compensation, and not by injunction. The obstruction was merely temporary, and might never happen again. The plaintiff had never yet suffered, nor was he likely to suffer, any damage from the defendants' works. The whole dispute had arisen from the plaintiff having insisted upon an erroneous view of his rights, based upon an exaggerated idea of what was meant by the word "water-tight." The appeal failed, and must be dismissed with costs.

Monday, Aug. 8.

Southwark and Vauxhall Water Company v. Wandsworth District Board of Works.

To-day the Court delivered their reserved judgment in the defendants' appeal from the order of Mr. Justice Kekewich made on the 8th ult. (see *ante*, pp. 160, 259).

The MASTER of the ROLLS said this was an appeal from the order of Mr. Justice Kekewich, by which he restrained the defendants, until judgment or further order, from lowering the surface of the streets in their district under which the pipes and mains of the plaintiff Company were laid, in any manner that would leave such pipes and mains without sufficient covering of soil or other material to protect them from frost, without first altering the position of the pipes and mains by placing them at such a depth below the surface as that they would not be exposed to greater danger from frost. It appeared that the District Board of Works had, in pursuance of the powers conferred by the Metropolis Local Management Act, 1853, lowered the surface of certain footpaths under which there were some pipes belonging to the Company. They had not touched the pipes; but the Company said that while lowering the paths defendants had exposed the pipes to the action of frost. This was their complaint. The section under which the defendants had lowered the street was section 98 of the 18 & 19 Vict., cap. 112. This section simply conferred a power. Its language imposed no duty; the words being, "it shall be lawful." Under certain circumstances, these words might impose a duty as well as confer a power; but it was for those who contended it did both to make good their contention. The defendants had not touched or disturbed the plaintiffs' pipes—they had in no way injured them; and this circumstance distinguished the case from that of *The Gaslight and Coke Company v. St. Mary Abbotts*, where the pipes were injured by a steam-roller. The plaintiffs assumed that they were entitled to have a certain amount of soil over their pipes; but there did not appear to be any ground for such an assumption. The order appealed from would be discharged, and judgment entered for the defendants, with costs; the costs in the Court below to be taxed as between solicitor and client.

Lord Justice CHITTY said he was of the same opinion. The decision would affect not only Water Companies but Gas Companies, who had the privilege of laying pipes under the road, and for which privilege they did not make any payment. The road authority had not altered the position of the pipes or disturbed or interfered with them; but the effect of the works, which had been lawfully executed, was to bring the surface of the street nearer the pipes which remained *in situ*. In executing the work, the defendants had not been guilty of any negligence. He was unable to find any express duty cast upon the defendants, when they altered the level of the road, whether by raising or by lowering it, to change the position of the pipes for the benefit of the Company owning them. The real question was on whom the expense of altering the position of the pipes was to fall. He was of opinion that it must fall on the Company, who were under no statutory obligation as to the depth at which the pipes should be placed below the surface. It was for them to put the pipes at such a depth as to protect them from frost.

Lord Justice COLLINS concurred.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Thursday, Aug. 4.

(*Before Mr. Justice* NORTH.)

Jordeson v. Sutton, Southcoates, and Drypool Gas Company and Others.

This morning, judgment was delivered in the above action, which was heard in February (see "JOURNAL," Vol. LXXI., pp. 284, 348, 409).

Justice NORTH, after describing the position of the plaintiff as owner of 24 houses in Clyde Terrace, Hull, and the exact situation of the property in relation to the defendant's works, went on to narrate the history of the Company, the various Acts of Parliament under which their powers were derived, and the proceedings which gave rise to the action—viz., the erection of a large gasholder, more than 105 feet in diameter, with three lifts of 35 feet each; making a total height of 105 feet, at a short distance from the plaintiff's property. For the purpose of this holder, the defendants, Messrs. Holme and King, Contractors employed by the Company, commenced in the summer of 1896 the digging out of a circular trench 37 feet in depth, which had now been completed; and within it a strong and solid wall had been erected, cemented, and puddled. It was well known to all acquainted with the district, that at the depth of about 16 feet there was a bed of running silt about 6 feet thick, and that special precautions would have to be taken to seal it up, and prevent it escaping into the trench. The Contractors selected one particular method out of several which had been described in the evidence; and he had already decided that in so doing they were not guilty of any negligence. At the same time, he thought they had failed to recognize the greatness of the risk. At any rate, the means taken proved insufficient; and the result had been disastrous. The barricade was inadequate to keep out the silt, a quantity of which escaped; the surface of the adjoining land was disturbed; and the buildings were cracked and injured to a serious extent. The trench itself was completed by Sept. 15, 1896, when the wall was commenced, which was finished in November. The damage to the plaintiff's buildings was first noticed in August; and it was not really disputed that it arose in consequence of the running out into the trench of what was in the silt bed. There was some difference of opinion as to whether what escaped was water only, or water mixed with sand; and on this question he had already expressed the opinion that it was not water only—the fact that the further one got from the trench the less disturbance there was of the soil, and the less damage to the buildings, appearing to be conclusive. If water only had escaped, he thought the subsidence would have been uniform over a larger area; and possibly no injury would have occurred to the cottages. With regard to the effect of the gasholder on the light coming to the windows of the plaintiff's property, there was not much divergence of opinion; and he thought the plaintiff's witnesses had given their evidence very fairly, and unusually free from exaggeration. They substantially agreed that until the holder rose above 68 or 70 feet, the effect would not be very serious; but that if this height were exceeded, it certainly would be. The direct sunlight would be cut off for several hours from some of the houses, which would be rendered unwholesome and gloomy, and their value would be seriously diminished. He was therefore clearly of opinion that there had been considerable damage to the plaintiff's property by reason of the withdrawal of the lateral support to the ground; and that if the gasholder were completed as proposed, the light would also be seriously interfered with. His Lordship then went into a long examination of the authorities with regard to the right to lateral support from adjoining land—reading several passages from previous judgments, and also those bearing on the contention of the defendants that what they had done was justified by their Acts of Parliament; and he came to a conclusion adverse to the defendants on all points. He also held that the Contractors were liable as well as the Company with respect to the damage caused by subsidence. With regard to the interference with the light, he had no option but to grant an injunction, because the case did not come within any of the exceptions in which damages might be given instead. But as it was clear from the evidence of the plaintiff's witnesses that if the gasholder were carried to a height not exceeding 68 feet it would not materially affect the plaintiff's rights, he should, while granting the injunction in the usual form, add a proviso that it was not to prevent the defendant Company from raising their gasholder on its northern side to the height of 68 feet from the surface of the ground. With regard to the interference with the support to the plaintiff's land and houses, the intended work had been completed in an apparently satisfactory manner; and since then no further subsidence had taken place, nor was any anticipated. One of the witnesses said the buildings seemed to have come to their new bearings. No injunction, therefore, was required; but the plaintiff was entitled to damages for the injury he had sustained. In the ordinary course, he (Justice North) should have directed an inquiry in Chambers as to this; but, as both parties asked him to settle the question, he somewhat rashly agreed to do so. Having referred to some of the evidence given on this point, he said he thought the damage from loss of rent, and injury to the buildings which would have to be made good, might be put down at £340, in which he did not include anything for loss of light, or any damage which might arise hereafter from future subsidence, because, according to a recent decision of the House of Lords, the latter would give a fresh cause of action. There would be judgment against the Company for the costs of the action, and against the Contractors for the costs of so much of the action as related to the subsidence.

Mr. HALDANE, Q.C., asked his Lordship to stay execution for a short time, in case the defendants should wish to carry the case further, and stated that the gasholder had now been completed.

His LORDSHIP said he understood that it was not necessary, or even contemplated, to use the holder to its full height, except in the winter time; so that the injunction would not be any real inconvenience. The costs would be taxed and paid on the usual undertaking of the Solicitors to return them if the appeal were successful. With regard to the damages, he would suspend the payment of them if the defendants would undertake to pay 4 per cent. interest on the amount.

Mr. HALDANE agreed to do this.

EASTBOURNE COUNTY COURT.—Thursday, Aug. 4.

(*Before His Honour Judge* MARTINEAU.)

Disputed Rates and the Quality of Water at Eastbourne.

To-day his Honour gave judgment in an action brought against Mr. R. G. Job, by the Eastbourne Water Company, for the recovery of £4 2s. 6d., water-rates. There was a counterclaim by the defendant for £1 10s. for damages alleged to have been sustained by him owing to a breach of contract on the part of the Company in respect of the quality of the water supplied. This was one of a number of cases which came before his Honour at a special sitting on the 20th of June last, in which similar points were raised; but Mr. Job's was the only one taken. Among the witnesses called were Dr. W. G. Willoughby (the Medical

Officer of Health for Eastbourne), Sir E. Frankland, F.R.S., and Professor Dewar. Judgment was reserved.

Mr. MOORE appeared for the Company; the defendant was represented by Mr. LAWSON LEWIS.

His HONOUR observed that there was no question as to the amount of the rates. Water had been supplied by the Company; and it might be taken that, subject to the counterclaim, the amount demanded was due and owing. The counterclaim was for £1 10s. as damages, on the ground that the Company neglected to comply with their statutory duty or obligation to furnish the defendant with a sufficient supply of good and proper water for domestic purposes, in consequence of which he suffered damage. The sole question was as to the right of the defendant to recover on the counterclaim. About the main facts, there was no dispute. Having cited the different sections of the Company's Acts and of the Water-Works Clauses Act, 1847, bearing upon the subject, he remarked that by section 35 of the latter Act the Company undertook to provide and keep in their mains a supply of pure and wholesome water sufficient for the domestic use of the inhabitants; and under section 36, a failure to supply after a demand in writing and the tender of an agreement to use the water by the required number of owners, rendered the Company liable to forfeiture, and to a penalty of 40s. a day during neglect, unless such neglect was attributed to frost, unusual drought, or other unavoidable cause or accident. From 1859, the year of the formation of the Company, to 1895, as he understood, the inhabitants had a sufficient supply of pure and wholesome water. In 1895, owing to the drought, the water in the Bedford Well became deficient in quantity, with the result that the sea water filtered through the strata into the well. This condition of things was due to natural causes, and could not have been caused by the Company; and he did not see any negligence or want of care on their part leading to the vitiation of the water. It was caused by no defect in the reservoirs or means of supply; and, so far as he could see, it was not possible for the Company to deal with the water in respect to this vitiation. The Company took measures to obtain another supply elsewhere; and the water was now of good quality. The question to consider was whether the Company were responsible for a breach of duty. He had some doubts as to the effect of the words "pure and wholesome." According to the experts called on the part of the Company, "pure" meant free from organic matter; in which case the water which was contaminated by sea water was pure. Further, it was sent out in the same condition as at the sources, and was the only water which the Company had power to supply. He was not prepared to accept the view of the experts as to the term "pure;" and he was disposed to give to it its popular application. He did not think brackish water could be treated as pure; and he was of opinion, therefore, that during the period of contamination the water supply was not pure and wholesome. Upon the question of the liability of the Company, his opinion was that they were not liable. They were authorized to supply the water taken from the Bedford Well and other sources; and they had supplied this water. The contamination of the water was due to no defect of the Company; and it was supplied by them just as it was derived from the springs and sources authorized by their Special Act. The Company had used all reasonable means to provide and keep in their mains a supply of pure and wholesome water. Even if the Company had committed a breach of statutory duty, his opinion was that an action would not lie in these circumstances; the only remedy for a consumer being by a proceeding under Section 36 of the Water-Works Clauses Act. It appeared to him that the Company had done all in their power to repair the mischief, for which they were not really responsible; and there would be judgment for them for the amount claimed—leave being given to appeal.

Mr. LAWSON LEWIS asked for a further adjournment of the other cases, in order that the defendants might consider the course to be taken.

This was agreed to; the question of costs being reserved until the hearing of the other cases.

Question as to Shipping a Cargo of Sulphate of Ammonia.

In the Queen's Bench Division of the High Court of Justice, on Monday last week, before Mr. Justice Bigham, Messrs. Hecker and Co., exporters, of London, sought to recover damages from the Cunard Steamship Company, Limited, for breach of contract entered into with the defendants to convey 30 tons of sulphate of ammonia to an Italian firm in Bologna. The ship was to sail for Venice. According to the case for the plaintiffs, the agents for the Steamship Company had constantly called upon them soliciting their carrying orders. The plaintiffs received an inquiry from the Italian firm in Bologna for the sulphate of ammonia, for the supply of which plaintiffs entered into a contract with the Sheffield Gas Company. They rang up, by telephone, the representatives of the Cunard Line in London, and eventually it was arranged that the ammonia should be shipped by the *Aleppo*, which sailed on March 18. The goods, at the request of the defendants, were forwarded from Sheffield to the Canada Dock, Liverpool. The *Aleppo* sailed on March 18 without the goods, whereupon the plaintiffs wrote holding the defendants responsible. The reply of the Cunard Company was that, by the foot-note at the end of their circulars, they were not liable for any goods which were not received alongside in time. It appeared that the plaintiffs had asked the defendants to sample and weigh the ammonia; and it was alleged on the part of the Shipping Company that this process had delayed the arrival of the goods alongside. It was further stated that sulphate of ammonia exuded moisture, and that to put it on the top of cargo would have been to injure other goods. His Lordship refused to allow the defendants to plead that the goods were not brought alongside in time because of the weighing; holding that it was a defence thought of at the last moment. In the result, the Jury found that there was a contract that the goods should be shipped by the *Aleppo*, and awarded the plaintiffs £1 damages. Judgment accordingly.

Drogheda Water-Works Purchase.—In order to complete the purchase of the water-works, the Drogheda Corporation have arranged for a temporary loan of £23,382 from the Bank of Ireland, pending the issue of Corporation stock.

MISCELLANEOUS NEWS.

THE GASLIGHT AND COKE COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held at the Chief Office, Horseferry Road, Westminster, on Friday—Colonel W. T. MAKINS (the Governor) in the chair.

The SECRETARY and GENERAL MANAGER (Mr. John W. Field) read the notice calling the meeting; and the seal having been affixed to the register of shareholders, the report of the Directors, given, with the accounts, in the "JOURNAL" last week, was taken as read.

The GOVERNOR said that, before dealing with the business generally, he might perhaps first welcome the proprietors for the first time at a meeting in that room. The rapid and considerable increase of the Company's business during the past few years had rendered it absolutely necessary for them to have larger office accommodation. The only site available for the purpose was that on which the building in which they were assembled stood. It was formerly occupied by a lot of disused and out-of-date gasholders, which were a nuisance to the station and the neighbourhood, and of very little use to the Company; but they stood at a considerable sum in their books. They had therefore debited to revenue the whole cost of the improvement as regarded the amount of capital standing to the debit of the gasholders, &c.; and the only part chargeable to capital had been the extra accommodation that had been provided. The charges were respectively £16,000 to revenue and £14,000 to capital. It was rather unfortunate that the Company should have to bear this special charge in the last few half years, when things had been more or less adverse to them; but, as the proprietors were aware, the Directors did not shrink from disagreeable duties. When a thing had to be done, they did not postpone it because the time was not convenient. The hall in which they were met would be used daily as a dining-place for their very large staff of clerks, whom they hoped to supply there with a good and wholesome dinner at a reasonable rate. The neighbourhood of Horseferry Road was not remarkable for convenience as regarded dining. He next had to refer with great regret to the loss they had sustained by the death of Mr. Henry Noel. Their late colleague had been a Director of the Company even since the amalgamation with the London Company; and he had endeared himself to every one of his colleagues, who heard of his sudden decease with great regret. About a month after Mr. Noel's death, they were fortunate in finding among the proprietors a gentleman thoroughly qualified to take his place—he referred to Mr. John Miles, whom they had elected to the vacancy. Mr. Miles had had long experience in the management of important public Companies—perhaps the most important being that ancient Corporation, the New River Company. He was also connected with Gas Companies—the Brighton Company, for instance; and he brought to them not only ability but also experience. Passing to the report and accounts, he remarked that the first paragraph summed up in a few lines the result of the half-year's working; and he would therefore only take the salient points in the accounts. Statement No. 3 showed that on capital account the half-year's expenditure had been £159,500; and the items analyzed were as follows: The retort-house and purifier-house at Beckton, which were required in anticipation of the next winter's working had cost £26,000; the mechanical stoking machinery, £5000; the extension of railway and jetty accommodation, which was to meet the ever-increasing work of their coke and coal stores, and generally, £4000; the extensions of mains and services, £4000—making a total outlay of £39,000 at Beckton. At Bromley and Nine Elms, on oil-gas manufacturing plant, which was available not only for the enrichment of coal gas, but also to meet any sudden emergency on dark and foggy days, they had spent £25,000. He might say, with respect to the cost of oil-gas manufacturing plant, that, speaking roughly, it compared with ordinary gas making at a cost of about one-half. On the offices in which they were assembled, they had spent for this half year £9000 out of revenue; on show-rooms at various parts of their district (which, he might say, were yielding most satisfactory returns), they had spent £5000; and on sundry works the outlay had been £2500. In the distribution department, their expenditure had been on new and additional service pipes £20,000. He looked upon this as one of the most, if not the most, satisfactory item of expenditure which they had to record, because it meant the steady increase of their business. On mains, they had expended £10,000; and on meters and stoves, £49,000. These two items again were for the same reason eminently satisfactory. These outlays would bring the Company an abundant profit. Notwithstanding this expenditure, their capital per 1000 cubic feet of gas made remained at the same figure as at June of 1897; and that in spite of the very small increase this half year in their sale of gas. As the proprietors were aware, no additional capital had been raised during the past half year. They were, he might say, rather sorely in need of capital; but they meant to try, if they could, to get through the half year without raising any capital, so that their next issue might be when they came under their new Act, when it would consist of the new form of stock. Their bankers were generally very kind to them; and unless there should be an unprecedented tightness of money (which he did not think they need anticipate), they would be able to go on without asking for any further capital until the commencement of 1899. He must, however, say, as a matter of precaution, that they could not stop their business; and if necessary they must have capital. They could only stop their business by disobliging their customers, and starving their district. Not only must they be ready to supply the wants of their consumers, but they must always be prepared to anticipate the latter's requirements in a liberal manner. He felt sure that the Court would have now, as they had always hitherto had, the support of the shareholders in making a proper and due provision for the extension of their business which they might reasonably look for. Turning to No. 4 account (the revenue account), there were one or two interesting items. First, of course, was the gas-rental. They had sold more gas by 1·66 per cent. than they sold in the June half of 1897. This was equal to an

increase in the half-year's gas-rental, at last year's price, of £25,000. Under the circumstances this was—he would not say a very satisfactory figure, but not an unsatisfactory figure, because they began the half year with very little hope of anything of the kind. The drop they had in their output of gas for January was 4 per cent., and for February it was 1½ per cent. At the beginning of March they stood something like 5 per cent. behind. In view of this serious loss of rental, and in view of the undoubted higher price the Company would have to pay for coal, he thought the proprietors would agree with him that the Directors were not acting at all with undue haste when they put the sliding scale into operation, and increased the price from 2s. 10d. to 3s. per 1000 cubic feet. If they had not done so, and the consumption had not recovered itself, as it did in a marvellous manner—because in March they had an increase of over 11 per cent., and the increase for the rest of the half year was fairly satisfactory—the whole of their reserve fund might have been swept away, and a considerable diminution in the dividend must have taken place. Having done what they all conceived that it was their duty to do in the interests of both consumers and shareholders, and following out the undoubted provisions of their Act, and carrying out the law both in its letter and spirit, they put up the price of gas from 2s. 10d. to 3s. per 1000 cubic feet; and they were now able to ask the proprietors to declare the statutory dividend, and, instead of sweeping away the reserve fund, to add £51,000 to it. He thought no further justification could be asked for for the policy they had felt bound to adopt. The question of the sale of gas was becoming every year—and he might almost say every month—a more uncertain quantity, and now depended very much on the presence or absence of clouds and on the height or depth of the thermometer. The experience of the past half year had shown this in the most remarkable degree. As he had told them, the heavy drop in the consumption of gas which occurred in January and February—which ought to have been their heaviest months and their largest gathering-time—was occasioned by the unprecedented conditions of the atmosphere; there being hot days all through these months. In March, however, there was a sort of blizzard, and an Arctic spell of a week or ten days, when the consumption went up by leaps and bounds—at the rate, on some days, of 22 million cubic feet. This was another reason why they must have plenty of margin of plant to meet any unforeseen demand. The stove-rental showed a very handsome increase of £2677, which included a small rental charged for automatic meter stoves. Coke had given them very good results in the half year. There had been a rise of 1s. 4d. for coke—a figure which he believed compared favourably with other Companies, and which had brought in an additional £30,000. A large part of this was, no doubt, due first to improved trade generally. Both the cement and other trades who used their coke had been in a much more flourishing condition than for some time previously, and naturally they had been able to pay more for their fuel. Secondly—and this was another interesting point, which he had mentioned before—it was due to the decreased quantity of coke they had for sale, which was caused by the large amount they used for making carburetted water gas. They therefore at the same time had an increased demand and a diminished supply, which must tell favourably on the price. He was glad to be able to inform the meeting that this improvement in the coke returns was not only fully maintained at the present date, but that the Directors had just settled their Beckton coke contracts for the coming twelve months at prices which would result in much more favourable figures than those for the past half year. With respect to tar, the return under this head was very slightly below the figure of June, 1897. It was an unfortunate statement to have to make, and their only consolation—and it was very poor consolation—was that they had not done worse than their neighbours. Ammoniacal liquor and its products showed a considerable improvement over the corresponding figures of last year. This was due not only to the better market price of sulphate of ammonia, which had gone up £2 per ton during the last few months, but also to the improved methods of dealing with their ammoniacal liquor, for which they were very much indebted to their intelligent Manager at their products works. He was very glad from his place to be able to express their indebtedness to Mr. Wilton for the way he had thrown himself into this work in the interests of the Company. He might say that their total residual products showed an improvement of 12½d. per ton of coal carbonized on the figures of the June half of 1897; and when they looked at the large amount of material dealt with by the Company, this made a great difference in their accounts. In reference to the expenditure, there was not much to call for special comment. Coals and enrichment had cost them in the past half year a little over 4d. a ton more than in June, 1897. But when they deducted the proceeds of the residuals, the net cost of their coals showed a reduction of 7d. per ton, or a saving of close upon 1d. per 1000 cubic feet of gas. This was a matter upon which he thought they might fairly congratulate themselves. He knew that it was customary in some places to say that nothing but optimism ever came from the Directors' side of the table; but he did not object to being optimistic when there was good cause for it. He never saw any reason why the shareholders should not hear good things inside when they heard so many bad things outside regarding the state of their affairs. The carbonizing results were again better. The quantity of gas sold per ton of coal and enriching material used was 278 cubic feet more than in June, 1897; and he wished, in connection with this result, to say that it reflected the highest credit on their engineering staff generally. It must mean very careful and skilful carbonization when they could raise the quantity of gas sold per ton of coal by as much as 278 cubic feet in six months. This was the first opportunity he had had of expressing the sense of the great loss the Company had sustained by the death of Mr. John Methven, who was the Manager for so many years at the Beckton station. Mr. Methven was too well known in the gas world generally for it to be necessary to say much with reference to his qualifications; but particularly was he known in connection with his photometric attainments. He (the Governor) was sure the shareholders would join with the Directors in lamenting Mr. Methven's loss, and in condoling with his widow and other relatives. The Company's wear and tear charges showed a small reduction; but he did not think that they could look upon this—at any rate yet—as an actual saving, although, no doubt, it was evidence that rather less of their yearly repairs were completed by the end of June this year than had been customary in past years. Still, he looked for no material increase in wear and tear charges for the year as a whole. Distribution charges showed an increase of nearly £5000. But considering the large increase in the number of their services, stoves, and meters, they must be prepared for an increase in these charges; and the advance was perfectly legitimate. He might tell them (if he was not wearying them with statistics) that they had now 210,900 ordinary consumers and 90,600 automatic meter consumers. Altogether, they had 320,000 meters in use; and they had supplied and fixed about 172,000 stoves. They also supplied gas to nearly 4000 gas-engines. There was now almost a stove to every two customers. This showed how very greatly the value, comfort, and convenience of gas-stoves were felt by people generally. He did not think he need go through any other items of the accounts; but he should be very glad to answer any question on them. The net result was a gross profit of £608,816, against £508,713 this time last year. The increase in the profit was £100,103; and only £35,000 of this was due to the increase in the price of gas, from the 1st of April last. This left as the result of better trading and working, £65,000 more profit for the half year, which he hoped they would think was not unsatisfactory. Their capital charges were rather less than they were in June, 1897, which was, of course, owing to the reduction of ¼ per cent. in the dividend consequent upon the increase of 2d. in the price of gas. On the other hand, they had to pay £1500 more for debenture interest, and £4800 more for bank interest; the two sums making £6332. The reduction in the dividend was £13,187; so that there was left a net saving of £6855 in capital charges for the half year. After providing for the preference charges, amounting to £414,591, they were enabled that day to declare a dividend at the statutory rate of 12¼ per cent., and to carry forward the balance of £51,854 to the credit of next half year. This was not only satisfactory to his mind, as he hoped it would be to the proprietors', but the prospects for the current half year were also very encouraging. Although they had to face a large increase in the cost of coal, the improvement in other departments of the Company's business was now, he thought, so assured that they might fairly anticipate a result equally good when they met again next January. He would only mention one point on this, which was that up to that day the increase in their sales was a little over 5 per cent. The increase in the price of coal to which he had referred had been brought about by two disturbances in the coal trade. The first was the anticipation on the part of the coal-owners that one effect of the operation of the Workmen's Compensation Act of last year would be an increase in the cost of production. The extra cost apprehended on this account immediately added 6d. to 1s. per ton to the price of coal generally; and since that time they had had that most deplorable labour conflict in South Wales, which had made every kind of coal very scarce indeed. The strike had added another 1s. or more per ton to the price of coal; and though he could only congratulate certain of their neighbours, who bought coal some time before their own Company did, and thus got it cheaper, he was afraid that those who bought after the Company would pay a great deal more. In fact, the price now quoted for coal approached the figure ruling at the time of the coal famine 25 years ago, at the close of which certain optimistic people told them that they would never hear of such prices again. It showed how a comparatively little disturbance in the production of coal in the United Kingdom had far-reaching effects; and they themselves, as well as steam-coal users, must bear their share of the burden. They could only hope that wiser and more conciliatory counsels might prevail, and that the conflict would shortly come to an end. He thought they would agree with him that if any justification were needed for their action in raising the price of gas from April last, it was to be found in the serious drop in their rental, and the serious increase in the price of coal. They had in their Company one very satisfactory item in connection with the coal question—namely, that on the 30th of June they had a stock of coal of 145,000 tons, which was equal to five weeks' consumption, and which had all been purchased under the low price of the late contracts. In addition to this quantity, they had a further 75,000 tons of coal due to them as arrears under those contracts, which would have to be delivered. Altogether, therefore, this half year would get the benefit of 220,000 tons of the cheaper coal; and this would tell favourably on their working. In view of this increase in the price of coal, the capital outlay he mentioned in his opening remarks would be very useful indeed. The two additional sets of oil-gas plant they had put down at Nine Elms and Bromley were already in working order, and would be fully ready for the coming winter; and he hoped that they would have plenty of coke to supply their own needs as well as more than they could have hoped for, under the circumstances, to sell. In connection with the question of their oil-gas supply, they would be aware that a Committee of the Home Office had been sitting with reference to the subject of carburetted water gas for illuminating purposes. He did not know whether they had yet concluded their labours; but he thought not. The Committee was presided over by Lord Balfour; and various members of their own staff and engineers of gas companies generally had given evidence. They hoped that the result would be that a reasonable amount of carburetted water gas would be allowed to be mixed with coal gas in the future. It had been found to be perfectly innocuous in proper proportions, and certainly it made gas cheaper and more easily produced for the consumer. However, they must wait the Committee's decision before they could say anything further on this. With reference to the question of photometry, the Gas Referees had recently notified their intention to substitute for the legal test-candles a new pentane lamp. Of course, the Directors had no wish whatever to evade any obligation imposed on the Company by the parliamentary bargain of 1876; and if the new lamp was found, after careful experiment, to be the true equivalent of 16 candles, the Directors would be perfectly prepared to accept it. Should, however, the lamp be found to necessitate the supply of gas of higher illuminating power than 16 candles, under the Act, they would be bound to object to put this burden on the Company. He hoped that, when the standard was properly adjusted, they might be able to adopt it with advantage both to the Referees, the testers, and their own officers. The next matter referred to in the report was the Company's Consolidation of Stock Act. He was happy to say that their Bill had passed through all its stages, and it received the Royal Assent last Tuesday. Their £13,000,000 odd of capital, with a standard dividend of 10 per cent., would in January next become £33,000,000, with a standard dividend of 4 per cent. The present £100 of 10 per cent. capital would become £250 of

4 per cent. capital; but the dividend received on the £250 would be exactly the same as was now received on the £100. He must congratulate the proprietors on having obtained the Act so successfully without alteration. The representatives of the consumers—the local bodies, the London County Council, and the City Authorities—as in duty bound, opposed the Company as hard as they could, and caused them a great deal of trouble and much additional expense; but the latter would come mainly out of the pockets of the consumers. The Directors got the Bill through, however, without any alteration, except an addition—it was not an alteration—put in by the House of Lords; being a declaratory clause that no increase in the value of the stock which might accrue by reason of the passing of the Act was to be taken into account by any arbitrator hereafter in fixing the amount to be paid by a public authority if they should desire to purchase the Company's property. He did not think there was much chance of their desiring to purchase the undertaking; the London Water Companies had to be dealt with first. If the Gas Companies' turn should come, the basis of price, if the price had to be fixed by arbitration, would have nothing to do with the market price. But it never had had; market price being a fluctuating matter arising from many accidental circumstances. The Directors, therefore, raised not the least objection to this clause being added to the Bill, which, with this exception, had passed through the House of Lords in identically the same shape as it was introduced into the House of Commons; and he believed it would be of great value to them. The only other matter in respect to Parliament was the resolution passed by the House of Commons, on the motion of Mr. Cohen, to appoint a Select Committee "to inquire into the powers of charge conferred by Parliament on the Metropolitan Gas Companies, and to report as to the method in which these powers have been exercised, having regard to the differences of price charged by the various Companies." He had some reason to believe that the form in which this reference was first drafted was directed simply against their own Company. But it was pointed out that there was no reason whatever why their Company should be put on its trial any more than any other Company; and that if Parliament desired information with respect to the effect of legislation which affected all the Metropolitan Gas Companies, it should include them all. He was glad to say that this view was taken by the mover of the resolution, which therefore appeared in the form named. With respect to the Committee in question, he was exceedingly glad that it had been appointed. He was quite sure that they would be able, willing, and anxious to give the Committee the fullest information on every point on which they might desire it. They had not, and they never had had, anything to conceal with respect to their Company. Everything had been explained to the shareholders, returns had been made to Parliament, and the Auditor of the Board of Trade had overhauled their accounts from time to time; and there was no information which they could offer which could not have been obtained without a Committee. Parliament, however, had ordered the Committee, to whom the Board would give the fullest possible information. The only other matter left for him to refer to was the question of compensation for accidents. Hitherto the Directors had dealt with accident cases on very liberal lines indeed, as they thought that it was the wish of the shareholders, as it was their own, that those who came to harm in the Company's employ should be treated fairly and liberally. Neither themselves nor their employees were at all delighted at this legislation having passed. They were already quite contented, and preferred to be under the old legislation. However, they must carry out the law. The course they had decided to take for the present was merely this: To watch what the effect of the Act would be, coupled with their own existing sick-fund, which they had brought into line as far as they could with the Act, giving rather better terms than the Act. For instance, they gave compensation for the first fortnight; whereas the Act gave nothing for the first fortnight. They would watch the effect of the Act and their own sick-fund for the next year; and they proposed to set aside £5000 to meet any extra cost that might accrue to them under the Act. As to the future, he had no wish to prophesy smooth things, or to be an optimist beyond what was justifiable; but he thought he might tell the shareholders that the Directors looked forward to the coming half year with far less apprehension than they did at the commencement of last half year. They had passed through six months of storm and stress, great anxiety, and a good deal of controversy; but in the end they had floated into smooth water. Their rental appeared to be increasing; he thought they would do well with coals and residuals; and he hoped to meet them next January with as good a story, if not a better one, than he had had the pleasure to unfold to them that day. He concluded by formally moving the adoption of the report.

The Deputy Governor (Mr. Howard C. Ward) seconded the motion.

Mr. C. E. Jones said that he would not for a moment depreciate the prospects of the Company. They had, however, a small increase in the sale of gas, and he should be glad if the Governor could offer any other explanation of this besides that of atmospheric influences. He had spent a long period in the coal areas of this country; and in his opinion, coal would never be much cheaper than it was now. There were certain causes which operated to keep up the price of coal. If, however, they paid more for coal, it followed that they would get more for coke; and he was glad to see that they were dealing with the problem of the output of coke in a very sensible way. His impression was that the answer to the coal-owners was to employ water gas. He was very pleased to find that their residuals had increased in value, although tar seemed to be a drug on the market. He thought the attention of the authorities might be very advantageously directed to the employment of tar mixed with asphalte for the making of roadways. As regarded sulphate of ammonia, he should like to see something done to encourage its sale. He used himself to send out small parcels of the article to those possessing a knowledge of agriculture, and thus secured customers; and he thought this example might be followed by the Company. With the exception of a little friction in certain quarters, everything had gone off well in connection with the raising of the price of gas. He was never a great believer in the sliding-scale himself, and it was capable of various interpretations; and they must not be at all surprised, when they next went to Parliament, if the sliding-scale proved to be a stumbling-block.

Mr. George Livesey said he wanted to congratulate the Directors on their success in carrying their Bill through Parliament. He also desired to congratulate them on the improvement in the market for coke and ammoniacal liquor, which had worked off the adverse balance of the previous year, and enabled them to meet the proprietors with a more satisfactory statement of accounts. He could not, however, congratulate them on the surplus, because he regarded the source from which it was derived as the very worst possible; two-thirds having been obtained from the consumers by the rise in price, the other third coming out of the shareholders' pockets. Before proceeding to deal with the accounts, he desired to clear up one point. The Governor had given a "Reply" to his (Mr. Livesey's) speech of last February; and he was quite willing to fall in with the Governor's view in deprecating any further discussion on this matter. He must, however, say one or two words. In his "Reply," the Governor said that he (Mr. Livesey) was animated by personal animosity towards him and Mr. Field; this view being based on a letter written five years ago, from which a misquotation was made, while the most important qualifying part was omitted. He had several times read what he said last February, and he could see nothing whatever in his remarks personally derogatory to him or Mr. Field; and in regard to Mr. Field, it was quite the other way. His attack last February was not on the Directors or on Mr. Field; but he did impeach the management, and said that he saw no hope of an improvement until he (the Governor) gave up the reins. He would be very glad to qualify that by saying "or until you alter your system of management." It would be a great satisfaction for him to see the system of management of the Company altered, and the Company put in its proper position as the leader of the gas industry of the world. It would, however, be anything but satisfactory to him to feel that he had done him any injury by any act or word of his. His attack was just the same in character as that which was continually taking place on the part of the Opposition to the Government of the country, and nothing more. As to other statements in the Governor's "Reply," he feared he must characterize many of them as misleading statements; but he did not intend to go into this matter, as he feared it might weary the proprietors, and he did not think it would do any good. Turning to the accounts, the general result was satisfactory; but he found that, on the expenditure side, there was practically no improvement—that the cost of gas per 1000 cubic feet made was, within a fraction of 1d., the same as it was a year ago. The cost of carbonizing wages was slightly lower in amount, but not lower per ton of coals used; and when he spoke of this he deducted 1½d. per 1000 for the cost of making water gas, and taking the difference as the cost of carbonizing. He did the same last year; and he found that last year the cost was 3s. 4·4d. per ton. This year it was 3s. 4·5d. per ton. There was, therefore, certainly no improvement in the carbonizing wages. But he did give credit to the carbonizing department for improved working. Last year the make per ton of coal was only 9917 cubic feet; whereas this year it was 10,167 cubic feet. This was so far good, though it was an improvement on what was bad previously. With respect to the Governor's remarks, in reply to his (Mr. Livesey's) statement last February that the carbonizing wages ought by this time to have been 1s. less per ton, the Governor stated that to have done so, and put in the necessary machinery to have effected this saving, would have entailed an expenditure of £1,000,000. His (the speaker's) reply was that their neighbours had done so; and it could not have cost them less in proportion than it would have cost this Company. The Brentford and South Metropolitan Companies had done this; and he saw no reason why The Gaslight and Coke Company should not also have done so. He did not believe it would have cost £1,000,000 or anything like it; for ever since 1889 they had had to spend large sums of money in renewing their retorts, and alterations could then have been made. With regard to the question of capital, he noticed that the Governor found fault with him for taking the last seven or eight years, and omitting all reference to the previous six years, when the capital account was being reduced in proportion to the business done. He did this advisedly. In 1883, he drew the attention of the Company to the excessive expenditure of capital, and from that time for a number of years the greatest care was exercised—in fact, the capital was materially reduced per ton of coal. But in the last seven or eight years they had reverted to the old system of extravagance. Taking the last twelve months, he found the increase of capital was £395,000, while the increase of business had been 391 million cubic feet. These figures worked out at £1011 per million cubic feet of gas sold. It was true that the increase of business was very small—only 2 per cent.; and it was also true that it was misleading, under ordinary circumstances, to take a single year. But when this followed a number of previous years in which an excessive amount of capital had been expended, he considered it an indication that there was no change in the system. In fact, the Governor said in his "Reply" that it was "a vindication of the principles upon which the business of this Company has been and will be conducted by the Court."

The Governor: Do you allow anything for providing for the future?

Mr. Livesey: You have been providing for the future for the last seven or eight years.

The Governor: We are always doing so.

Mr. Livesey: Well, there was the fact of the great expenditure of capital which he had mentioned. Continuing, he said he had gone far enough back. He had gone back to 1869, from the time when The Gaslight and Coke Company absorbed the two City Companies, and included the whole expenditure on Beckton and all their works. He found that the total expenditure of the Chartered Company from 1869 amounted to £497 per million cubic feet of gas sold. They had had in that time an increase of 11,783 million cubic feet; and it worked out at £497 per million cubic feet of gas sold. The Company had built new works. There were two other Companies in precisely a similar position. The Commercial Company had a limited district, incapable of extension. He had taken that Company's accounts since their amalgamation with the Ratcliff Company in 1875, and found that they had met all their extensions of business, including new works at Poplar, at an expenditure of £308 per million cubic feet. The South Metropolitan Company had erected new works since their amalgamation with the Phœnix Company, and their total increase of capital on the increased business came to £359 per million cubic feet sold. Therefore he maintained that The Gaslight and Coke Company had spent on new works in round figures about £150 per million cubic feet of gas sold more than the other Companies; and this £150 excess represented nearly £2,000,000, which cost something near £200,000 a year for interest.

The GOVERNOR dissented, and referred to the debenture stock that had been raised.

Mr. LIVESEY (continuing) stated that the expenditure included a very large portion of the "A" stock, and that bore 12 to 13 per cent. He held that at any rate the interest on the £2,000,000 went a long way to account for the difference of 3d. per 1000 feet more required by The Gaslight and Coke Company to pay their dividend as compared with what was required by the other two Companies. His reason for drawing attention to this capital outlay was to try and induce the Directors to alter their principle, and to spend capital as carefully as the other Companies did. Turning to the Directors' report, the first paragraph related to the increase of price. He was very sorry indeed that they had had to increase the price; and he was not at all sure that it was absolutely necessary. However, the price was increased, and their dividend was reduced. One reason for the increase of price was that they worked more expensively than the other Companies, and because, though they had an unrivalled district, they had not cultivated it as they might have done. The Governor mentioned in his "Reply," as a proof that The Gaslight and Coke Company had not an unrivalled district, that in fourteen years the consumption in the case of the South Metropolitan Company had increased 111 per cent., while the increase of the Chartered Company had been only 42 per cent. This was an extraordinary fact—that a Company less than one-third of the size of the Chartered had a greater absolute increase than the larger Company. He (Mr. Livesey) contended that this was one of the most conclusive pieces of evidence that could be given as to the advantages of low prices. He quite agreed with the Governor that the thermometer had a deal to do with the matter from year to year; but here was an experience extending over a large number of years. The fact that the South Metropolitan Company had been selling gas at some 6d. or 7d. per 1000 cubic feet less than the Chartered Company had a good deal to do with the great increase in the sale by the South Metropolitan Company as compared with the small increase of the Chartered Company. He held that it was their duty to make friends wherever they could; and he believed that by fair dealing towards the customers, and by showing them every possible consideration, they might cultivate friends. He was quite sure of the advantage attending the allowing of discounts to large consumers. The South Metropolitan Company did so; and it was done all over the country. He maintained that it was a right thing to do, and that it did a great deal to satisfy the consumers. In other ways the consumers' interests ought also to be considered to the utmost; and if this had been done, the Chartered Company would have had a larger increase. The time had come when gas companies must seek business, and must adapt themselves to the requirements of their customers, just as was done in any ordinary business; and he believed that, if the Chartered Company did so, they would find the benefit in a much larger increase of business. If they had had the increase of business which they might have had, and had worked as well as the other Companies, they would have been able to sell gas at 2s. 6d. per 1000 feet, which would have meant that the consumers would have paid about £500,000 less, and the shareholders would have had another £90,000 a year in dividends. He regarded the position of the Company as a very serious one; and the Court did not see it. The Governor, in a reply to his (the speaker's) letter a fortnight ago, said "There are two points in your letter in which I am not able to agree: 1, As to the 'most serious position' into which you state our management has brought the Company, you are quite right in your opinion that the Court, with perhaps one exception, does not realize its existence." This was further evidence to his mind of the hopelessness of the Company's present position. So long as they persisted in their present system of management, so long it seemed to him the Company would not occupy the position which it ought to hold. This was the only Company in the United Kingdom using more than 100,000 tons of coal a year (excepting the Alliance and Dublin Consumers' Gas Company) that charged more than 3s. per 1000 cubic feet for gas. The Dublin Company used 133,000 tons, their price being 3s. 5d.; but they had the worst district. If they wanted to find companies charging as high as 3s., they must go to the small ones. The reason why The Gaslight and Coke Company met with such poor results was their system of management. He wished to speak with every respect of their General Manager, but he did maintain that, while that gentleman was an admirable Accountant, a thoroughly honest man, and completely devoted to the interests of the Company, he had not the commercial faculty. The Governor said in his speech at the last meeting, that at the beginning of March, there would be, he knew, an undoubted increase in the price of coal.

The GOVERNOR: I said we expected it.

Mr. LIVESEY said so did other people. Common report credited their General Manager with dealing with this question. He tried to get in at the old rates, and their contracts were deferred from March to May, with the result that they had to pay from 1s. to 15d. per ton more than they paid last year. Other Companies, however, bought their coal in March and April, and at an advance of only 3d. or 4d. a ton. If the Boards of those other Companies had had control in this Company, they would have bought all the coal that they required at an advance of not exceeding 6d. a ton, and have saved in this way at least £50,000. Mr. Field, however, he understood, stood out for the old price; but it was impossible to get in at that rate, and they had to pay all the more. He held that if Mr. Field had been a man of commercial faculty he would have seen the necessity of paying more, and would have got in at a lower price than he did. The Governor had spoken of a "one-man Company." It was the business of the Chairman to watch the markets, and to keep himself posted with the general trend of prices. He conferred with his colleagues from time to time. This year a coalowner called on the Chairman at the works to renew a contract. That was in March. He asked for an advance of 6d. a ton; but it was seen or felt that he would take an advance of 3d. This was reported to the Board, by whom the matter was thoroughly discussed, and they agreed to offer an advance of 3d. on their old contract price; and practically they got their coal at that price. He maintained, with all deference, that this was the way in which so important a business as a coal contract ought to be managed. No one man ought to do it; it was too important a matter. He wished Mr. Field no harm. What he desired was that that gentleman should retire on a very handsome pension; and if the Directors proposed to pay him his full salary, he (the speaker) would hold up both his hands for the proposal. Mr. Field had worked hard for the Company; but he was not the right man in the right place. The Board appointed a Director last year; and the appointment met with universal approval. The gentleman was one of the ablest in the gas profession; and they all thought that, with this gentleman on the Board, they would see a great improvement in their working. He had, however, been on the Board for a year; and, so far, he (the speaker) could see no improvement whatever. Judging from the result, it would seem that all his experience and his efforts to help the Company were futile. Reference had been made by the Governor to the death of Mr. Henry Noel. A month after, it was stated, a man in every way suited to occupy the position was appointed. But he thought that a little slip was made in that matter. Mr. Noel died on the 7th of June; and at the next Board meeting, on the 17th, the vacancy was filled up. He thought he could understand the haste with which Mr. Miles had been appointed. He suspected that the Directors were afraid that some of the shareholders might, if they heard of the vacancy, write and suggest successors; and it was to forestal such a contingency that the vacancy was filled up. He might, of course, be mistaken in his view.

The GOVERNOR: You certainly are.

Mr. LIVESEY, continuing, said that what the Company wanted was not a general Director. Mr. Miles was a good man of business (as a matter of fact, he was a Director already of no less than eight companies); but he knew nothing special in connection with gas. What the Directors ought to have done was to have strengthened the previous appointment that they had made when Mr. Woodall was elected. He knew it would be said "You want a place;" but he did not appreciate the honour at all, nor did he wish to increase his work or responsibilities. He maintained, however, that the Board ought to have been strengthened by another man from the gas profession to help Mr. Woodall. His only desire was to see this great Company in its proper position, but so long as they, with the richest district in the world, charged 9d. per 1000 cubic feet more for gas than other companies supplying poor districts, there must be dissatisfaction, and a feeling that the Company was not properly managed.

Sir RICHARD H. WYATT ventured to think that, instead of Mr. Livesey coming to their meetings and "throwing dirt" on the directorate, he should in a friendly manner, not in a public place, consult with them in regard to what was best to be done for promoting the interests of the two Companies. He should certainly object to Mr. Livesey being appointed on the Board of The Gaslight and Coke Company, with that gentleman's views as to labour directors. He considered that it was quite impossible to follow the speech of Mr. Livesey, full of figures as it was. He earnestly appealed to him not to come there and make attacks on the Company, and thereby cause their interests to be adversely affected. When a gentleman in Mr. Livesey's position came there and proclaimed that the Company was in a serious position, the statement might have very prejudicial effects on them.

A SHAREHOLDER said he thought that they ought to be very much obliged to Mr. Livesey for coming there as he did, and advocating that the Company should be carried on in a less wasteful manner. He was a shareholder in the South Metropolitan Company, and he wished The Gaslight and Coke Company were under the same management.

Another SHAREHOLDER wished to ask whether they could hold out any hope to the public at large that they would have a reduction in the price of gas shortly.

The GOVERNOR, in reply, said that no one would be better pleased than he to be able to say exactly when they hoped to take off the extra 2d., or a portion of it. It all depended on the course of their business, and the price of coal. Mr. Jones had said that the increase in their rental had been very small; and that was true. But they had a very different district to that of the South Metropolitan and Brentford Companies. He supposed that theirs was the most electrically lighted district in the world. Mr. Jones had also said that coals would never come down again, and that the existing high prices were permanent. But they had always found that when coal went to an unduly high price, new pits were opened, and the price soon came down again. History repeated itself; and he had very little doubt that when the labour troubles were at an end, if prices did not go down too rapidly, more pits would be opened and the prices would fall again. As to water gas, they were following the policy advocated by Mr. Jones. They were also acting on his policy in regard to sulphate of ammonia. As regarded their going to Parliament, and Mr. Jones's remarks about the sliding-scale, he thought that nothing had come out clearer in all their parliamentary fights during the last few years than the sacred character which attached to a parliamentary bargain; and in reference to the capital already raised under Acts of Parliament, he did not believe for a single moment that a public breach of faith would be committed by Parliament. With respect to further capital which they might have to raise in the future, it was another question alto gether. He rejoiced that Mr. Livesey was in a less combative mood than he was six months ago; and he accepted that gentleman's statement that he intended no personal attack on them last February. He had no doubt that he did not intend personally to attack any one; but it had all the appearance of being such an attack. It had been an expensive matter to circulate his reply to their 12,000 proprietors; but he had only received four replies at the outside—three of them entirely approving of the reply, and one of them approving it except the question of meter rental, on which the correspondent agreed with Mr. Livesey. It had another result, in having reduced the market price of their stock from £315, at which it was prior to February, down to £282. It was quite true that 15 or 17 per cent. of the drop was on account of the loss of ½ per cent. dividend; but all the rest was the result of what occurred last February. Fortunately, the price of the stock had since gone up, and was now just under £300, which he thought a little low, taking the 4 per cent. value, which appeared to be the general value of gas investments now. Then Mr. Livesey said that he thought they were in a very serious state. He could not understand how a Company which had gradually reduced the price of its gas for many years, had made great concessions to the public, and had only gradually increased its dividend within the lines of its legislation and now paid 12¼ per cent., could be said to be in a very serious condition, with a continued increase in its business, although it was small compared with that of the South Metropolitan Company. The public had had reductions in the price of gas to the tune of £13,000,000 within the last twenty years; and it could not have been very bad management to have produced such a result. As regarded their carbonizing wages, and the extra amount of capital he said it would be

necessary to spend in order to bring their wages to anything like the level of Mr. Livesey's, £1,000,000 was the figure that was given to them by Mr. Trewby; and he could not go behind it. Mr. Livesey, he also noticed, did not allow enough for expenditure which had to be made in advance, and which did not produce for the time being the extra million cubic feet of consumption. They had at Beckton some very large works, which hardly existed at any other gas-works in the world; and a good deal of their capital could not strictly be called applicable to producing the increase of the million cubic feet. Mr. Livesey said that other Companies had gone to this expenditure, and had got the results he mentioned; and The Gaslight and Coke Company were gradually doing the same thing. But the other Companies had not had to do what their Company had had to do—do away with a lot of old works, and annihilate a large amount of capital, which stood in their books, but which there was nothing now to represent. They had been forced to do this by Parliament. As to the buying of coal, all the Companies did not purchase their coal in the same way; but they did very much what Mr. Livesey suggested—they watched the market. Fortunately, Mr. Livesey had made his purchases better; and he congratulated him. As regarded working generally, he did not find that they were so much worse off than their neighbours, even on the south side of the river. He found that last half year their residuals brought them in 6s. 11¼d. per ton, as compared with 6s. 8¼d. in the case of the South Metropolitan Company. Then, as to the net cost of coal, they had improved on the June half of 1897 12½d. per ton, as compared with 7½d. in the case of the South Metropolitan Company. They had also sold 278 cubic feet more gas per ton of coal than they did a year ago; but the South Metropolitan Company had apparently gone down 40 cubic feet. But he did not attach importance at all to these figures. They saw no reason why they should give discounts to their large consumers. They treated them all alike; and they believed this was in accord with their Acts of Parliament. As regarded the personal question in connection with the Board, he regretted that it had been raised. He accepted Mr. Livesey's correction as to the date of Mr. Miles's election as a Director; but he (the Governor) knew that the vacancy was inevitable—Mr. Noel having been ill for a long time. There was, however, no indecent haste in filling up the vacancy. There was no expectation of any suggestion on the matter coming from shareholders; and there was no "sharp practice" of any sort or kind. He believed in cheap gas just as much as Mr. Livesey; and the efforts of the Board were directed to selling it as cheaply as they possibly could. But they had drawbacks which Mr. Livesey had not. He was quite sure that if they had been "a Court of Cowards" they would not have raised the price when they did; but they had always held that the right thing ought to be done at the right time. He repeated that the action they took in this matter was justified. He then put the motion, and it was carried unanimously.

Resolutions were afterwards passed empowering the Directors to dispose of property belonging to the Company which was not now required for their purposes, and authorizing the holding of the next half-yearly meeting in January instead of February.

A discussion followed on a motion of Mr. Henry Hounsom to the effect that a verbatim report of the proceedings of the meeting should be circulated among the proprietors.

The Governor said he estimated that the cost would be about £200; whereas the "Journal of Gas Lighting" and other papers gave a very fair *résumé* of what took place.

Mr. Livesey stated that the South Metropolitan Company had for some years circulated the "Journal" report; and the last time it cost them only about £13 for nearly 8000 shareholders.

On being put to the meeting, the motion was lost on the show of hands.

The proceedings then terminated.

BRENTFORD GAS COMPANY.

The Half-Yearly General Meeting of this Company was held on Friday, at the Charing Cross Hotel, Mr. Howard Charles Ward in the chair.

The Secretary (Mr. W. Croxford) having read the notice calling the meeting, the Directors' report and the accounts for the half year ended June 30 last (*ante*, p. 262) were taken as read.

The Chairman, in moving the adoption of the report and accounts, said he thought the shareholders would be satisfied with the result of the past six months' working—at any rate, the Directors were very well contented with it. He had nothing startling to tell them; but, besides having earned their dividends, they had a little surplus. The amount available for distribution was £59,390; and this enabled them to pay the customary dividends—namely, at the rate of 5 per cent. per annum on the preference stock; at the rate of 12 per cent. per annum on the consolidated stock; and at the rate of 9 per cent. per annum on the new stock, 1881. In the half year under review, their sales of gas had increased by 6·3 per cent., as compared with an increase in the corresponding period of 1897 of 9·68 per cent. They had to remember, however, that the months of January and February of this year were very unfavourable, as regards the weather, for gas companies. Taking account of this fact, he thought the increase of 6·3 per cent. on the increase of 9·68 per cent. in the corresponding six months of the previous year was not unsatisfactory. Of course, their customers grew in numbers half year by half year; and this was particularly marked in the case of consumers by automatic meters. The number of these meters in use in the Company's district on June 30 last was 13,312, as against 9567 at the same date in 1897—showing an increase of about 40 per cent. This looked as if the use of gas, for heating and lighting purposes, was not being disregarded. They were busy putting up water-gas plant at Brentford and also at Southall. At the former place, in fact, it had been completed, and had been in use with considerable success. Not only did they make gas, he believed, cheaper by means of this plant, but the illuminating power was more under control. The installation at Southall was also being proceeded with without delay. The new plant had to be paid for, and money had to be found for the purpose. Therefore, during last half year, they had put up for sale by auction £15,000 of new stock, 1881, as intimated to the proprietors at the last meeting; and he was pleased to say it realized £31,330, or a premium of £16,330. The average price obtained for the stock was £208 16s. per cent., which was very good. Of course, the premium of £16,000 odd was not available for distribution in the form of dividends, but would go into the general capital of the Company. It would be necessary to put up by auction a further £15,000 worth of new stock at the end of October or the beginning of November. So far during the current half year their sales of gas had increased at the rate of 9 per cent., which was very satisfactory for the summer months. Turning to the revenue account, the proprietors would see that the half-year's revenue from sales of gas by meter and public lighting amounted to £110,502, as compared with £104,040 at June 30, 1897—a very considerable increase. The revenue from public lighting showed a decrease for the six months of about £400. They had one or two electric lighting corporations in their district; and they were fond of sticking up electric lights in the highways and byways. But the curious fact was that the reduction in this Company's receipts from public lighting was accompanied by an increase in the number of public lamps. The explanation of this was the great appreciation of incandescent gas-burners. Then, the rental of meters had gone up; but although the number of stoves was larger, the rental derived from them had decreased a little. The shareholders would naturally ask how this was. The fact of the matter was that they used formerly to charge a rental for stoves supplied by the automatic meter system. But the Board found that this caused a little grumbling on the part of the consumers; so they had made "a virtue of necessity" and discontinued the charges, especially as they thought it was, to some extent, reasonable, seeing that by the automatic meter system the price charged for gas was higher than the ordinary price. The result had been that, whereas the rental for stoves was £1694 for the corresponding half year of 1897, the amount for the six months under review was only £1566. Their residual products had yielded rather better returns; the sum received for them in the half year having been £22,000 odd, as compared with £19,500 in the corresponding six months. If they looked on the debtor side of the account, he thought they would find that everything had gone on satisfactorily. The item of repairs and renewals of meters had increased very considerably; but that was a healthy sign, as it indicated the progress made by the Company's business. The ordinary meters were replaced by new ones to the extent of one-twentieth, or by 5 per cent. every year; and the contractor also kept the meters in repair. Their stoves were written down by 12½ per cent. per annum. As regards the automatic meters, they were written down by 10 per cent. per annum; and the automatic fittings, by 15 per cent. He thought that Mr. Field (one of the Auditors) was very well satisfied with this rate of depreciation. In the past ten years their capital had increased by 35 per cent.; but, on the other hand, their business, as shown by the quantity of coal carbonized, had grown by 70 per cent. In 1888, their capital per ton of coal carbonized was £7 4s. 7d.; but during the past year it was £5 19s. 11d.—a material and satisfactory reduction.

Sir Richard Henry Wyatt seconded the motion.

Replying to a proprietor, the Chairman stated that in 1894 the capital of the Company was £835,600; whereas it was now £949,980. The additional capital was represented, of course, by assets in the form of buildings, mains, coals, &c.

The motion was put and agreed to unanimously.

On the motion of the Chairman, seconded by Sir R. H. Wyatt, the dividends recommended in the report were agreed to.

Mr. J. E. Corbyn then proposed a vote of thanks to the Chairman and Directors, which was seconded by Mr. Borradaile, and passed.

On the motion of Mr. Andrew Thomson, seconded by Lieut.-Col. Elyard, and supported by the Chairman, a similar compliment was paid to the Engineer and Manager (Mr. J. Husband), to the Secretary, and to the other officers of the Company.

Mr. Croxford having briefly acknowledged the vote, the proceedings terminated.

CRYSTAL PALACE DISTRICT GAS COMPANY.

The Ordinary Half-Yearly Meeting of this Company was held last Friday, at the Albion Tavern, Aldersgate Street, E.C.—Mr. George Livesey in the chair.

The Secretary (Mr. Charles M. Ohren) having read the notice convening the meeting, the Directors' report and the accounts for the six months to June 30, as summarized last week, were taken as read.

The Chairman moved—"That the report of the Directors and the accounts be received, adopted, and entered upon the minutes." He said he could assure the proprietors that it was with feelings of great pleasure that the Directors met them on this occasion, and submitted this motion. For some time past, he must confess (as he dare say the proprietors must have noticed from the remarks made on the Directors' side of the table) that they had not been altogether happy in regard to the state of the Company; but now they were in the very satisfactory position of being able to come before the proprietors with the statement that the Company had "turned the corner"—that, whereas for some years past the Company seemed to be losing ground, they were now on the upward track again. The accounts showed that, while in the corresponding half of 1897 they were deficient by £3669 of the amount required for the dividends, in the past half year they were only £438 short. This was largely due to an improvement in the working, and to a certain improvement in the receipts for coke and sulphate of ammonia. The increased income from coke was due to an advance in its value, but the increase in the receipts for sulphate of ammonia was attributable to two causes—partly to an improvement in its value, and partly to an increase in its production. Previously they had been making only a very small quantity of ammonia; and, though they were not now doing what they hoped to accomplish shortly, they were working considerably better in this respect than this time last year. The result was that, while last year the Company only realized for products 5s. 7d. per ton of coal carbonized, they had this year obtained 6s. 7d., or an increase of 1s.—equivalent to £2600 in the half year. Coal had cost about the same per ton; but receiving 1s. extra per ton of coal carbonized for products, brought down the net cost of coal from 7s. 11d. in 1897 to 6s. 11d. in 1898. Still, so far as this extra 1s. was concerned, they only took credit for a part of it—the greater part (taking

coke and sulphate of ammonia together) being due to the improved market values. Turning to the other side of the account (which, he remarked, was really the most important), he said that the amount the residual products had realized might be entirely beyond the control of the Directors. The residuals might produce a higher price, of which the Company obtained the benefit, but for which the Directors could not take credit. On the other hand, the residuals might realize a very low price, whereby the Company suffered loss; but no blame could attach to the Directors, because it was beyond their power to control it. But in the matter of expenditure, they had something which was, within certain limits, under their control. He did not mean to say the expenditure could be reduced to an unlimited extent; but in the year there had been a very considerable improvement. Last year they were in the position, in regard to the carbonizing wages, of standing at a very high figure—nearly 3s. 6d. per ton of coal carbonized; to be exact 3s. 5·86d. This was unsatisfactory; and it was particularly unsatisfactory because some other companies had succeeded in materially reducing their carbonizing wages in the years that had elapsed since the great rise of 1889, when the Gas Workers' Union came into existence. In this connection, it was rather unfortunate that the Crystal Palace District Gas Company should have had him (Mr. Livesey) as their Chairman at this particular time, because the Governor of The Gaslight and Coke Company, in a very elaborate reply to strictures of his on their working, dragged in the Crystal Palace Company, and said: "It is, however, permissible to compare this Company's [The Gaslight and Coke Company's] wages with those of the Crystal Palace District Company; and the comparison shows that, although that Company has all the advantages of Mr. Livesey's experience and of his profit-sharing scheme, its carbonizing wages are higher than those of this Company, and its carbonizing results are worse than those of any other Gas Company in or near London." This was a pretty sweeping declaration. But the carbonizing results in the past half year showed a considerable improvement. In the first place, their Engineer (Mr. S. Y. Shoubridge) and those who were under him, had increased the make of gas per ton from 9440 cubic feet to 10,029 cubic feet. The former figure was very low; and it was perfectly true that the results then were worse than those of any other Company in London. But he did not know that there was any necessity for the Governor of The Gaslight and Coke Company to say so. However, they had now got up to a make of 10,029 cubic feet per ton of coal; and he expected it would go higher still—at any rate, he considered that an increase in production of nearly 600 feet of gas per ton was a good step in advance in the course of a year. Then as to cost, the carbonizing wages had come down from nearly 3s. 6d. per ton of coal to 3s. 3½d.—a reduction of close upon 2½d. per ton. On a previous occasion, he felt it his duty to state that the workmen were not doing their best—they were not giving the Company a fair day's work for a fair day's wage. He, therefore, felt it was only just to say now that they had improved considerably; and when he told the proprietors that they had, for a smaller payment in wages (£912 less), produced more gas, and yet had used less coal, they would agree that the men had been doing their duty in a much more satisfactory manner. The quantity of coal carbonized in the six months was 2223 tons less, which was equal to a reduction of 4 per cent.; and, as they had produced 3 per cent. more gas, they had an improvement in this department of about 7 per cent. He believed Mr. Shoubridge would tell them that he was not at all satisfied with this, and would not be satisfied until he showed a still further improvement. [Mr. Shoubridge assented.] At any rate, the better working reflected great credit on their Engineer; and he (the Chairman) was glad of the opportunity of saying that the men had responded in a proper spirit, and were doing their work much more satisfactorily than previously. Now the Company he previously referred to had had no decrease in their carbonizing wages—in fact, last year the wages averaged 3s. 4·4d. per ton of coal, while this year they were 3s. 4·5d.; so they had gone up 0·1d.; as against their own decrease of nearly 2½d. Then there was another satisfactory point; but perhaps the proprietors would not consider it so. He referred to the maintenance and repair of works and plant, which was £2200 more than in the first half of last year. This, in his opinion, was highly satisfactory. It showed they were putting the works into proper order, and were able to do it out of revenue. There were certain portions of the plant that had run down; and Mr. Shoubridge had been devoting his attention to restoring the works to a thoroughly perfect condition. This, as he had said, they had been doing out of revenue; so that the favourable results which the Directors were able to present to the proprietors that day could not be attributed to any undue charging to capital of amounts that perhaps ought not to go to capital. On the contrary, they had charged to revenue everything they could; and nothing had been placed to capital other than was necessary and proper. When the charge for maintenance and repairs was reduced to the "per ton of coal carbonized" basis, it would be seen that it had gone up from 2s. 3·85d. to 3s. 2½d., or rather more than 10½d. He was quite certain of one thing, that there was no money spent by a gas company that was more productive than money wisely laid out in putting the works in good order. The net result, as he had said, was that, whereas they were this time last year £3660 short of the amount required to pay the dividend, they were on this occasion only £438 short, which was equal to about ¼d. per 1000 cubic feet of gas. They had done this, and yet maintained the low price of gas. They had not found it necessary to increase the price. It had remained at the low figure, for a suburban district, of 2s. 7d. per 1000 cubic feet; and the Directors saw their way clear to continue at this rate, and pay full dividends. They also hoped to accumulate a little surplus; and they believed that shortly (he could not say how soon, but they hoped it would not be long) they would be able to reduce the price to the figure at which it once stood—viz., 2s. 6d. per 1000 cubic feet. Altogether, he did not know that he had ever felt happier in standing before a meeting of shareholders when presenting a report than he did that day; for he certainly did not expect they would recover so rapidly. He expected, and so did his colleagues, that there would be a considerable deficiency in the past half year. The reserve fund still stood at an ample figure; and the Board were now looking forward to adding something to, instead of drawing from, the reserve fund. Therefore he was justified in the opinion that, far from a threatened increase in price, a reduction had come within measurable distance.

The Deputy-Chairman (Mr. Frederic Lane Linging) seconded.

The Chairman having replied to some remarks by a shareholder, who contrasted the present position of the Company with what it was during the time of the late Engineer, the motion was put and unanimously carried.

On the proposition of the Deputy-Chairman, seconded by Mr. James Glaisher, dividends at the rate of 5 per cent. per annum on the preference stock and of 5½ per cent. on the ordinary stock, less income-tax, were declared.

Mr. H. D. Ellis said it was usual at such meetings to pass a formal vote of thanks to the Board for their able management; but he did not think he would be rightly interpreting the wishes of the proprietors if he made it a mere matter of form on this occasion. A gas company might have a good district, good works, and a good Act of Parliament; but all three were not worth much without good management. In the Chairman, his colleagues, and the officials, they had excellent management; and he was sure the proprietors ought to express their gratitude to the Board for the way in which they had conducted the business during the past half year. There were one or two pleasing points in the accounts which he might be allowed to briefly refer to. Not the least was the fact that wear and tear was charged as high as carbonizing wages, which was a very unusual feature in gas companies' accounts. Nothing could be more sound than charging all they could to revenue, and so relieve the capital. When a company had a good year, it was wise policy to put the extra money earned into the works or into the reserve fund rather than into the pockets of the proprietors; it would do much more good. Another point which had struck him was that the amount of unaccounted-for gas was particularly satisfactory this half year; it seemed to him to be very low indeed. The Chairman had referred to the possibility of making a reduction in the price of gas; and he had also adverted in this connection to the possibility of increasing the reserve fund. He (Mr. Ellis) should be glad to see the reserve fund increased. It was at a good figure now; but it could be better. If a lower price meant an increase in the dividend, he should be very thankful to have it; but he would much rather that the extra dividend should be put into the reserve fund or the works. The proprietors were getting good dividends now; and they ought not to be greedy. The market value of stocks and shares did not depend so much on the dividend as on the stability of the concern, and the power to maintain the dividend; and a good reserve fund was a guarantee that it would be maintained.

Mr. T. Guyatt seconded the motion, which was carried *nem. con.*

The Chairman sincerely thanked the proprietors for the way in which the motion had been submitted and passed; remarking that the Board had experienced the kindness of the shareholders at times when they had not been able to come before them under such favourable circumstances as at present. They felt, especially on this occasion, that the vote was not meant to be an empty compliment; but a thorough expression of the good feeling of the proprietors towards them. Before concluding, he moved a hearty vote of thanks to Mr. Shoubridge and Mr. Ohren, and their respective staffs.

Mr. Linging seconded the motion, which was agreed to.

Mr. Shoubridge, in responding, assured the proprietors that the improvement in the results of the half year had afforded the employees very great satisfaction, as it showed that the concern was rapidly ascending from the period of depression through which it had been passing, and that it would soon take its rightful place among the gas companies of the country. He ought perhaps to say, with regard to the large expenditure on repairs and maintenance, that, if the proprietors looked into the matter, they would find that the amounts spent under this head had been, for some years past, considerably less than in the case of the other Suburban Companies; and, of course, the works had suffered in consequence. They were now putting this right. A great deal had been accomplished in the past half year to remedy the deficiencies that existed; but still more remained to be done. No doubt in the current half year, the expenditure might possibly be diminished. But, as the Chairman had rightly said, it was remunerative expenditure; and it had helped them to bring about the improvement in the working results. He firmly believed that, in a very short time, they would, in addition to paying for all repairs out of revenue, be in a position to put a large sum to the reserve fund.

Mr. Ohren having briefly replied, the proceedings terminated.

BROMLEY GAS CONSUMERS' COMPANY.

Half-Yearly Report and Accounts.

In the report which the Directors of the above-named Company will present at the half-yearly general meeting next Thursday they state that the quantity of gas made in the six months ending June 30 shows an increase of 6 million cubic feet over that of the corresponding period of 1897. With the exception of tar, residuals have recently realized better prices. Coals, however, are dearer. The works and plant, under the supervision of Mr. W. Woodward, are in excellent condition. The accounts accompanying the report show that the sale of gas produced £16,302; the rental of meters, £479; and residuals, £4131—the total receipts being £21,226. The expenditure on the manufacture of gas came to £11,278 (coals costing £8441); on distribution, to £391; and on management, to £1501—the total expenditure being £14,239. The amount carried to the profit and loss account is £6987; and the balance on that account is £7673. The Directors recommend the declaration of dividends at the rate of 11½ per cent. per annum upon the ordinary 10 per cent. shares, and 8½ per cent. per annum upon the ordinary 7 per cent. shares. This will absorb £6062, and leave a balance of £1611 to be carried forward. The quantity of coal and cannel carbonized in the six months was 11,222 tons; the residual products being: Coke, 11,222 chaldrons; breeze, 2139 chaldrons; tar, 104,135 gallons; sulphate of ammonia, 78 tons 11 cwt. The make of gas was 112,991,000 cubic feet, of which 106,741,500 cubic feet were sold and 1,668,500 cubic feet were used on the works; leaving 4,581,000 cubic feet unaccounted for.

Nelson Gas-Works Extensions.—The Nelson Corporation on Wednesday adopted a proposal of the Gas Committee to apply to the Local Government Board for their sanction to the borrowing of £40,000 for gas-works extensions.

SOUTH METROPOLITAN GAS COMPANY.

The Half-Yearly Accounts.

In the "JOURNAL" last week, we gave the report of the Directors of the above-named Company for the six months ending June 30, which will be presented at the meeting of the shareholders to-morrow. It now remains to notice the accounts accompanying the report.

The first three statements relate to the capital of the Company; the next two, to the revenue. We give below the capital, revenue, and net revenue accounts. Following these are the statements relating to the reserve, renewal, and insurance funds. They show that the balances on June 30 were as follows: Reserve fund, £95,791; renewal fund, £17,532; insurance fund, £45,441. The statements dealing with the manufacturing operations of the Company furnish the following particulars:—

STATEMENT OF COALS.

Description of Coal.	In Store, Dec. 31, 1897.	Received during the Half Year.	Carbonized during the Half Year.	Used during the Half Year.	In Store, June 30, 1898.
	Tons.	Tons.	Tons.	Tons.	Tons.
Newcastle coal	76,978	415,310	476,193	479	15,616
Cannel coal	1,440	..	215*	..	1,225
	78,418	415,310	476,408	479	16,841

* 257,703 gallons of petroleum spirit used as a substitute for cannel.

STATEMENT OF RESIDUAL PRODUCTS.

—	In Store, Dec. 31, 1897.	Made during Half Year.	Used in the Half Year.	Sold in the Half Year.	In Store, June 30, 1898.
Coke—cwts.*	432,093	5,866,965	1,231,658	5,039,729	27,671
Breeze—yards	9,194	105,825	15,593	97,653	1,773
Tar—gallons	415,579	4,668,752	21,597	4,647,224	415,510
Ammoniacal liquor—butts.	20,336	149,592	66,773	94,158	8,997

* 1 cwt. of coke about equals one sack of four bushels, under the Weights and Measures Act, 1878.

STATEMENT OF GAS MADE, SOLD, &c.

Description of Gas.	Quantity made.	Quantity Sold.		Total Quantity accounted for.	Number of Public Lamps.
		Public Lights (estimated).	Private Lights (per Meter).		
	Thousands.	Thousands.	Thousands.	Thousands.	
Common	4,854,337	230,479	4,365,335	4,662,954	20,723

The remaining statement in the balance-sheet, which gives the value of the stores in hand, is as follows: Coals and enriching materials, £9917; coke and breeze, £896; tar, sulphate, and liquor, £4645; and sundries, £128,980. The figures this time last year were: Coals, &c., £18,603; coke and breeze, £10,998; tar, &c., £4563; and sundries, £112,720. A sum of £13,002, workmen's bonuses and savings, has been deposited with the Company, and the total of the officers' superannuation and guarantee funds is £33,797.

CAPITAL ACCOUNT.

	£ s. d.	£ s. d.
Capital account to Dec. 31, 1897	..	3,638,281 8 1
Expenditure during half-year to June 30, 1898, viz.—		
New buildings and machinery in extension of works	20,178 1 2	
New and additional mains and services	16,661 18 6	
New and additional meters	13,690 9 8	
New and additional stoves	13,309 2 4	
	63,839 11 8	
Cr.—By sale of property	1,897 16 0	
		61,941 15 8
Total expenditure		3,700,226 8 9
Balance		196,593 2 11
		3,896,819 6 8
Nominal amount added by conversion		3,190,680 13 4
Total	£	7,087,500 0 0

Description of Capital.	Certified to Dec. 31, 1897.	Received since that date.	Total.
	£ s. d.	£ s. d.	£ s. d.
Ordinary stock	2,246,250 0 0	68,750 0 0	2,315,000 0 0
Premium on do.	386,832 0 0	27,500 0 0	414,332 0 0
Debenture stock	893,333 6 8	..	893,333 6 8
Premium on do.	274,154 0 0	..	274,154 0 0
Total	3,800,569 6 8	96,250 0 0	3,896,819 6 8
Nominal amount added by conversion—			
Ordinary		2,898,168 0 0	
Debenture		292,512 13 4	
			3,190,680 13 4
Total		£	7,087,500 0 0

REVENUE ACCOUNT.

To Manufacture of gas—		
Coal into store, including cost of petroleum spirit for enriching and including £19,938 6s. 10d. for labour	£232,781 15 3	
Purification, including £6311 18s. 8d. for labour	11,611 15 0	
Salaries of Engineer and Officers at works	6,957 4 6	
Wages (carbonizing)	51,802 12 10	
Repairs and maintenance of works and plant, including £37,112 8s. 1d. for labour, less £1731 10s. 5d. received for old materials	74,700 4 3	
		397,853 11 10
Profit sharing for 12 months to June 30, 1898	19,296 11 7	
Less on account, December 31, 1897	7,000 0 0	
		12,296 11 7
Distribution of gas—		
Repair, maintenance, and renewal of mains and service-pipes, including £11,582 11s. 3d. for labour	17,818 19 11	
Salaries, &c., Officers and Rental Clerks	11,032 5 0	
Repair, &c., of meters (£1285 12s. 9d. for labour)	8,996 7 10	
Repair, &c., of stoves (£3141 18s. 0d. for labour)	10,910 8 5	
Gas-fittings (labour)	2,477 18 9	
		51,235 19 11
Public lamps—lighting and repairing, including £5767 10s. 1d. for labour		6,516 13 9
Rents, rates, and taxes—		
Rents payable	£339 1 5	
Rates and Taxes	28,052 17 6	
		28,891 18 11
Management—		
Directors' allowance	£1,750 0 0	
Salaries of Secretary, Accountant, and Clerks	2,334 16 0	
Collectors	8,330 18 8	
Stationery and printing	1,768 12 4	
General charges	3,589 12 6	
Company's Auditors	112 10 0	
		17,886 9 6
Law charges	£76 9 7	
Parliamentary charges	86 0 6	
		92 10 1
Bad debts		1,414 0 10
Pensions and officers' and men's superannuation and sick funds		4,561 17 8
Gas Referees and Official Auditor		314 7 9
Leasehold Renewal Fund		300 0 0
Total expenditure		£521,364 1 10
Balance carried to net revenue account		189,769 12 1
		£711,133 13 11

By Sale of gas—		
Lady Day, at 2s. 3d. per 1000 feet	£291,208 9 9	
Midsummer, at 2s. 3d. per 1000 feet	194,362 12 8	
	£485,571 2 5	
Public lighting and under contracts, including Lighting, Repairing &c., £6516 13s. 9d.	32,502 1 6	
		£518,073 3 11
Meters in use: 171,407—		
Company's meters at rent: Ordinary, 87,879; automatic, 72,288	£16,985 2 1	
Company's Stoves and fires at rent: Ordinary, 38,700; automatic, 56,977; fires, 8269	15,034 18 5	
		32,020 0 6
Residual products—		
Coke, less £2,570 8s. 8d. for cartage; £14,181 16s 8d. labour, &c.	£111,420 8 1	
Breeze, less £866 13s. 7d. for cartage; £2328 5s. 8d. labour, &c.	5,843 6 6	
Tar, less £132 1s. 0d. for cartage; £292 13s. 5d. labour, &c.	14,981 9 9	
Ammoniacal liquor, less £27 11s. 3d. for cartage; £216 14s. 2d. labour, &c.	15,188 15 0	
Sulphate of ammonia, less £4319 7s. 9d. for acid, &c.; 1295 7s. 10d. labour, &c.	12,016 19 6	
		159,450 18 10
Rents receivable		1,517 10 8
Transfer fees		72 0 0
Total receipts		£711,133 13 11

PROFIT AND LOSS (NET REVENUE) ACCOUNT.

Interest on temporary loan and deposits		£1,964 9 2
Interest on debenture stock		21,900 0 0
Balance applicable to dividend on the ordinary stock		168,265 13 1
		£192,130 2 3
Balance from last account	£146,997 17 7	
Less dividend for the half year ended Dec. 31, 1897	145,195 6 3	
	£1,802 11 4	
Amount from revenue account	189,769 12 1	
Interest on Bankers' balances	557 18 10	
		£192,130 2 3

THE WORKMAN-DIRECTOR SCHEME OF THE SOUTH METROPOLITAN GAS COMPANY.

It may be remembered that in the concluding paragraph of the half-yearly report of the Directors of the South Metropolitan Gas Company which appeared last week, reference was made to the draft of the proposed scheme for the election of Employee-Directors which is to be submitted to the shareholders for their approval to-morrow. The principal portions of the scheme are as follows:—

The preface, or preamble, sets forth that by Section 19 of the South Metropolitan Gas Act, 1896, provision was made for authorizing the Directors of the Company to prepare a scheme for the election of one or more Directors by the shareholding employees, when the investments of the latter should exceed the nominal amount of £40,000, and submit it to a special general meeting for adoption. In the event of its approval, it is to be laid before the Board of Trade, and, on being passed by the Board, is to be published in the "London Gazette," and remain in force for three years, or till the employees' investments fall below the nominal amount above named. The qualification of the employees' representative upon the Board was originally to be the holding of not less than £250 nominal value of the ordinary stock of the Company. Under the Act of last year, however, the money qualification was reduced to £100. As the total investments of the employees now exceed the nominal amount of £40,000, the Directors have prepared the following scheme.

1. *Interpretation.*—In this scheme, "the Company" means the South Metropolitan Gas Company; "employees" means persons in the employ of the Company, and holding stocks in the capital of the Company; "Employees' Director" means a Director elected by the employees.

2. *Commencement of Scheme.*—This scheme shall come into operation as soon as it has been adopted by the shareholders of the Company in manner provided by the South Metropolitan Gas Act, 1896, and approved by the Board of Trade, and shall continue in force for three years and no longer, subject to cesser if the amount of the investment of the employees in the stock of the Company shall fall below the nominal amount of £40,000.

3. *Number of Employees' Directors.*—Employees in receipt of weekly wages shall have the power to elect two Directors, herein referred to as "the two Directors," and employees on the staff receiving salaries payable monthly shall have the power to elect one Director, or three in all.

4. *Scale of Voting.*—Every employee shall have for this purpose one vote for every £10 of stock held in his own name, or jointly with that of his wife or child, up to £100 . . . . . 10 votes.
One vote for every £25 above the first £100 up to £300 8 additional votes.
One vote for every £50 above the first £300 up to £1000 14 " "

Above £1000 no more votes; thus giving a maximum of 32 votes.

5. *Qualification of Employees' Director.*—The qualification of an employees' Director shall be the having been not less than seven years in the employ of the Company, and the having held for not less than twelve months prior to the date of election, and the continuing to hold, not less than £100 in the Stock of the Company.

6. *Nomination of Candidates.*—The Company shall, one calendar month at least prior to the date of election, make out an alphabetical list of all the employees possessing the necessary qualification to act as Directors, giving the name of the station at which each candidate is employed, his length of service, and his occupation. Such list shall be printed and posted up for seven days in conspicuous places at the various works or stations of the Company, and shall be supplied to any shareholding employee on application at the head office or the office of his station. Any qualified employee not wishing to be a candidate can have his name withdrawn by writing to the Secretary to that effect within eight days from the posting up of the list; and his name shall forthwith be struck out of the posted lists.

7.—*Selection of One Candidate by each Station.*—For the first election (when the two Directors are to be elected), every voter at each station, and at subsequent elections when, in consequence of death or retirement, only one Director is to be elected, every voter at each station except the station at which the Director remaining upon the Board is employed, shall be supplied with a voting-paper in the form prescribed in the Schedule A attached hereto. Such voting-paper shall be addressed personally to each voter, and shall contain the names of all the workmen employed at the station who are qualified and willing to act as Directors. If he desires to record his vote, he shall place his full number of votes, as set out on the voting-paper, against the name of any one candidate whom he thinks best fitted to become a Director, sign the paper, and hand it to the persons—viz., one officer nominated by the Board, and the last elected workman member of the Profit-Sharing Committee—who shall be appointed to receive it. In the event of any candidate receiving a majority of the total number of votes polled at his station, he shall be the selected candidate for that station; but should this not be the case, new voting-papers shall be issued containing the names of the two candidates who received the highest numbers of votes. A second vote shall, in that event, be taken; and the candidate who receives the highest number of votes shall then be the selected candidate for that station.

8. *Final Voting for Two Workmen-Directors.*—When this selection has been made, another voting-paper (Schedule B), containing the names of the selected candidates of the several stations, shall, on the first occasion of electing two Workmen-Directors, be supplied to every voter at all the stations. Voters must put the full number of their votes against each of any two names, or their voting-papers will be spoiled and their votes lost. At subsequent elections, when only one Director is to be elected, the process as set out in this clause shall be repeated, with the single alteration that the full number of votes shall be placed against one name only.

9. *Representation of Various Stations.*—No station shall at any time have more than one Workman-Director on the Board.

10. *Retirement of Employee-Directors.*—One Director of the two Directors elected under this scheme shall retire after the first Board meeting in the month of November every year. If duly qualified, the retiring Director shall be eligible for re-election. The first retirement shall be settled by ballot, the following ones by rotation.

11. *Time of Election.*—The first and succeeding elections, except in the case of unexpected vacancies, shall take place between the 1st of September and the 1st of November in each year, on a date to be fixed by the Board. Employee-Directors whose turn it is to retire shall continue to serve until their successors are appointed and take office. In the event of retirement at other than the usual time, or the death of an Employee-Director, a successor shall be elected within two months, at a date to be fixed by the Board, who shall take the place, and retire in the turn, of the late Director.

12. *Fees.*—The Employee-Directors shall have their ordinary duties and the pay attaching thereto suspended during the time that is found to be necessary for their duties as Directors. The fees shall "bear some proportion to the amount of their qualification," relatively to those of ordinary Directors, which are equal to one-fifth part of the nominal value of their qualification, and will accordingly be about £20 per annum. The fees for their service as Directors shall be the amount they would have earned if they had been at their ordinary employment, *plus* 10s. 6d. for each weekly attendance.

13. *Staff Representation.*—The above regulations shall, so far as is necessary and practicable, apply, *mutatis mutandis*, to the election of a Director by the salaried officers of the Company.

Passed by the Board, July 6, 1898.

[Schedule A is the form of voting-paper for the selection of the station candidate; and Schedule B, the form of final voting-paper.]

THE PLYMOUTH CORPORATION AND THE GAS COMPANY.

The Opposition to the Company's Bill.

At the recent Annual Meeting of the Plymouth and Stonehouse Gas Company (see Vol. LXXI., p. 1582) the Chairman (Mr. G. Henderson) and the Deputy-Chairman (Mr. J. A. Bellamy) complained of the hostile attitude which the Corporation maintained towards the Company. The immediate cause of these remarks was the fact that the Corporation had lodged a petition against the Bill promoted by the Company this year. This petition was at the last moment withdrawn; but, as the Chairman explained, the Company had then been put to an expense of £1000 in preparing to meet it. The Parliamentary Committee of the Town Council have now drawn up a report upon their action, which seems to be intended as a reply to the Gas Company, and is altogether so interesting a document, and so instructive a revelation of the ways of municipal corporations, that no excuse is needed for reproducing it in the "JOURNAL."

The Plymouth and Stonehouse Gas Bill, 1898.

This Bill appeared to prejudicially affect the Corporation and also the inhabitants of that part of the borough in the immediate neighbourhood of the gas-works. The Corporation was affected: (1) By the provision in the Bill by which the Company sought the privilege of supply in those parts of the borough not already in the Company's limits of supply, and in which, but for the Bill, the Corporation would have a right of supply by the operation of the Public Health Act of 1875. (2) By the provision enabling the Company to manufacture and store gas on the lands proposed to be acquired from Mr. Ward. In this connection it should be mentioned that the promoters omitted to incorporate in the Bill the provisions of the statute law which would save the rights of the public to restrain the commission of nuisances. (3) By the provisions extending the limits of the Company's supply.

A petition was accordingly presented against the Bill by the Corporation, claiming protection with regard to these and subsidiary matters. It was further claimed in the petition that the illuminating power of the gas should be increased, and a central testing-place provided.

With regard to No. 1, the Corporation was advised that the special circumstances of the case were such that the Company would probably succeed in its attempt to deprive the Corporation of its right. The Company having declined to yield, the opposition to the Bill on this head was, in view of the advice above referred to, abandoned.

With regard to No. 2, an effort was made by friendly negotiation to incorporate in the Bill a provision enabling summary proceedings to be taken in respect of such nuisances as have from time to time arisen at the gas-works, but without result. A clause was ultimately agreed to, incorporating the provisions of the general law. This has been, at the instance of the Corporation, inserted in the Bill; thus saving the rights of the Corporation and the public in relation to any nuisance which may arise on the lands proposed to be used for the purposes of the Bill.

With regard to No. 3, the following clause was agreed, and has been inserted in the Bill: "Provided also that the Company shall not, by any exercise of their powers in regard to the expenditure of capital or otherwise within the area added to their limits of supply by this section, either increase the price charged for gas within the existing limits of the Company, or prevent or hinder the reduction of that price under the provisions of the Act of 1894." With regard to the illuminating power of the gas, this having been recently raised by Parliament at the instance of the Corporation from 14 to 15 candles, it was felt undesirable (although the illuminating power is not regarded as satisfactory) to incur expense in raising a controversy in Parliament on the subject.

The Committee are glad to be able to report that it was not found necessary to brief Counsel or to incur expense beyond the the trifling cost attendant upon lodging the petition, and in settling the provisions necessary for the protection of the Corporation.

Incandescent Gas-Lights at Marlborough Gate.—An improvement has been effected in the lighting at Marlborough Gate (the gateway across the road leading into St. James's Park from Pall Mall) by the substitution of incandescent burners for the old flat-flame ones in the two centre lamps. Each lamp has two burners, and the combination gives the light of 400 candles with a total consumption of 16 cubic feet of gas per hour, as compared with 30 candles for a consumption of 12 feet under the old arrangement. The new burners have been placed by the Welsbach Incandescent Gas-Light Company, Limited.

GLASGOW CORPORATION GAS AND ELECTRICITY SUPPLY.

The Annual Reports.

As mentioned by our Scotch correspondent last week, the reports of the Committee of the Glasgow Corporation on Gas and Electricity for the year ending the 31st of May have been issued.

The Gas Committee report that the gross revenue amounted to £631,644, and the gross expenditure to £526,355, to which was added depreciation written off capital to the amount of £35,716—making the discharge £562,071, and leaving a balance of £69,573 to be carried to profit and loss account. The Committee had to meet the following requirements during the year: Annuities on stock, £33,603; interest on borrowed money and redeemed loans, £29,713; sinking fund, £5615—together, £68,931; leaving a surplus of £642. To this there is to be added the balance of £360 brought from last year; making a sum of £1002. Out of this the Committee had transferred to the contingent fund £500; leaving a balance of £502 to be carried forward. The Committee regret that the market for residuals has been unfavourable to the Corporation, with consequent reduction of income from this source; the average price received per ton of coal carbonized having been 2s. 0·22d., as compared with 2s. 1·72d. in the previous year. Coke realized £2200 more—the increase being due to the greater quantity sold. The average price received was 5s. 0·75d. per ton, compared with 5s. 2·12d. in the preceding year. The Committee, as usual, advertised for tenders for coal to be supplied during the coming year; and they have concluded contracts for a portion of the quantity required. Notwithstanding the decreased value of residuals and an increase in the price of coal, the Committee recommend that the price of gas be continued at 2s. 2d. per 1000 cubic feet. The quantity of gas sold or accounted for during the past year was 4,800,357,000 cubic feet; being an increase of 174,376,000 cubic feet, or 3·77 per cent. The sinking fund, with its accumulations, now stands at £348,531. The works and pipes have been maintained in an efficient condition. The construction of the new gasholder, referred to in the last report, is well advanced, though not to the extent anticipated by the Committee; and it is very doubtful if it will be of use during the coming winter. Additional retorts, condensers, scrubbers, and purifiers are in course of erection at the Dawsholm works, and will very shortly be completed. These extensions will exhaust the ground available for manufacturing purposes belonging to the Corporation Gas Department; and it will be necessary to obtain parliamentary powers next session for the purchase of additional ground for the erection of works to meet the continually increasing demand for gas. The use of oil gas for enriching purposes at the Temple Gas-Works, continues to give entire satisfaction; and a considerable extension of the oil-gas plant is in course of construction. About 22 miles of new mains were laid during the year, to supply the increasing demand in several districts. The greatest quantity of gas sent out in 24 hours was 31,354,000 cubic feet, and the maximum daily make was 27,446,000 cubic feet. The number of meters in use on May 31, 1898, was 186,327—an increase of 6963. During the year, 18,091 meters were repaired; 20,836 were examined while in use, of which 17,342 were found in a satisfactory condition and 3494 defective—the latter being removed. The number of gas-stoves let out on hire on May 31 was 13,551. The number of gas heating and cooking appliances sold during the year was 1532.

The Electricity Committee report that the gross revenue amounted to £36,360, and the gross (or working) expenditure to £18,890, to which is added depreciation written off capital to the amount of £8945—making a gross discharge of £27,525, and leaving a balance of £8525 to be carried to the profit and loss account. Out of this sum the Committee had to meet the following requirements: Interest on loans, £4814; and sinking fund, £1537—together, £6351; leaving a balance of £2174, which has been placed to the credit of the reserve fund account. In order to maintain the undertaking in its present favourable position, the Committee, taking advantage of the prosperous state of the finances, have transferred from revenue to capital, for depreciation on machinery and plant at John Street and Waterloo Street stations, and on accumulator battery stations and the Mitchell Library plant, in addition to the usual amounts, the sum of £3243, which is included in the above sum of £8945. The Committee propose several alterations upon the system of charging for energy. The quantity of electricity sold to private consumers during the year was 1,885,902 units; being an increase of 46·48 per cent. on the preceding year. The number of private consumers on May 31, 1898, was 1437; being an increase of 347. The quantity of electricity used for street lighting was very little higher than in the preceding year—viz., 228,134 units, as compared with 210,422 units—there having been only seven additional lamps erected; making a present total of 119. The number of 8-candle lamps applied for (or the equivalent in other devices) was 150,000; being an increase of 42·6 per cent. as compared with the year 1896-7. The number of units consumed per lamp fixed for private consumers was 15·47, as compared with 12·48. New mains and feeders were laid to the extent of about 13 miles, in order to meet the ever-increasing demand for electricity. The question of the extension of the supply has received full attention; and new works and plant are already in course of erection at Port Dundas. The Pollokshaws Road site is also being prepared as rapidly as possible for the new works and plant which will be erected there during this year. No further supply can possibly be given from Waterloo Street; but it is hoped that a considerable addition can be afforded from Port Dundas for the coming winter, and from the Pollokshaws Road station during next year. New mains are being laid in various parts of the city; and the street lighting of the electric tramway route is well advanced.

Godalming Water Supply.—The Godalming Town Council have resolved to purchase the Frith Hill, Godalming, and Farncombe Water Company's undertaking; and a Committee has been formed to arrange all formalities and, if necessary, to promote a Bill in Parliament for the acquisition of the undertaking. According to the terms agreed upon in the negotiations, the Corporation's liability in purchasing the concern will be £67,250, involving £2858 8s. 7½d. yearly. The annual repayment of existing loans is equivalent to a rate of 2s. 1½d. in the pound on the district rates.

HEYWOOD CORPORATION GAS SUPPLY.

Local Government Board Inquiry.

At Heywood, last Thursday, Colonel A. J. Hepper held an inquiry on behalf of the Local Government Board into an application of the Heywood Corporation for powers to borrow £10,000 for the purposes of the gas undertaking. The Town Clerk (Mr. J. H. Baldwick) stated that the application was made under a Provisional Order granted by the Board last year, by which previous Local Acts were amended so as to permit of the purchase and utilization of certain lands for gas purposes in lieu of other lands for which powers had been obtained, but which were now found unsuitable. The present gas-works occupied a site of 2½ acres only; and they would require to be extended at a future date. The lands mentioned in the schedule of the Order had now been purchased for £1347, which, with the addition of £153 for legal charges, fencing, &c., made a total of £1500, for which sanction for borrowing powers was required. A sum of £2000 was for new mains for the next four years, and a similar sum needed for penny-in-the-slot meters. The Corporation had made an experiment with these meters with very satisfactory results; and it was consequently proposed to spend £400 per annum for the next five years in providing them. A sum of £3000 was required for gas cooking-stoves. There was a large demand for these stoves; and there were already 2014 of them in use. An additional sum of £600 was necessary for a coke-breaker and plant, and £900 for a store-room, stables, &c. Mr. Baldwick explained that the total borrowing powers, including annuities for the gas undertaking amounted to £133,330; and there had already been overspent on capital account £1324. Evidence in support of the application was given by Mr. J. Diggle, Mr. Walter Whatmough (the Gas Engineer), and Mr. W. H. Booth (the Borough Accountant). On the Inspector asking if any person wished to make any remarks in reference to the application, Mr. E. Collier, without opposing the application, asked if the Town Council were taking any steps with regard to the electric light. He thought the expenditure of £10,000 would be unwise if the Corporation should decide to adopt the light. Mr. Maden, the Chairman of the Gas Committee, replied that the Town Council had not taken any action in regard to the matter; and he could not say what might be done. The Inspector remarked that if they adopted the electric light they would still require their gas-works. Mr. Maden admitted this. The inquiry then ended; and subsequently the Inspector visited the gas-works.

PUBLIC LIGHTING IN AMERICAN CITIES.

The last report of Mr. Henry Hopkins, the Superintendent of Street Lighting for the City of New Haven (Conn.), a copy of which we have received from the author, contains abundant proof that his interest in the subject of public lighting is by no means confined to the city with which he is officially connected. This is strikingly shown by the fact that he has included in his report to the Common Council of the City some statistics relating to other towns which it may be useful for us to reproduce.

Dealing first with New Haven, the Committee on Lamps report that at the beginning of the financial year, there were in use 412 electric street lights; 4 arc lights in public buildings, 719 gas-lamps, and 504 naphtha lamps; making a total of 1639. During the year the Committee put up 30 electric lamps, 38 gas-lamps, and 17 naphtha lamps, and discontinued the use of 14 gas-lamps and 11 naphtha lamps. The total number in operation on Dec. 1, 1897, was therefore as follows: Electric street lights, 442; arc lights in public buildings, 4; gas-lamps, 743; naphtha lamps, 510—total, 1699. Excluding the arc lights, there were upon the streets 1695 lights—an increase of 56 in the year. Incandescent gas-lights to the number of 105 were in use; and upwards of 175 requests were received for improved Welsbachs—showing the satisfaction given by the incandescent gas system. The expenditure of the Lighting Department amounted to $75,300, whereas the sum appropriated was $78,348. The Department handed over $2463 to the City Treasury (being the only one who could respond to the call of the Controller), and carried forward $585. Referring to this fact in his report, Mr. Hopkins remarks that the aim of the Committee has been to conduct their business at as small an expense as is consistent with reliable and increasing service; and he points to the facts of a healthy increase in the number of public lights, a decrease of complaints, and an unexpended balance handed over to another department, as evidences of their success. With regard to the lighting at New Haven, he reports favourably upon both the gas and electric divisions. The lighting by naphtha is mostly resorted to in the outlying districts; and the lamps are not very favourably regarded by the public, as, being subject to severe tests from high winds and the destructive habits of mischievous boys, they do not burn very steadily. Moreover, the naphtha is apt to become gummy, and clog the burners with carbon. Mr. Hopkins, of course, favours a change to gas-lamps.

Coming to Mr. Hopkins's collected statistics, we find that it costs New Haven, on an average, $478 per mile to light the streets. This works out to 64c. per head, as compared with 50c. in New York City, 64c. in Cleveland, 80c. in Baltimore, $1·73 in Providence, $1 in Cambridge, 88c. in Worcester, 57c. in Washington (D.C.), and $1·61 in Detroit, where there is a municipal plant. Where coal is used, the average candle power furnished per hour by electric street lights in New England is 472 for 1c.; whereas New Haven gets 488-candle power per hour for this amount. Providence has 700 lamps of 18-candle power, costing $30 per lamp per annum for 4000 hours' burning. The entire care of the lamps is undertaken by the contractors, who furnish the burners (5 feet) and the gas; the Municipality providing the posts and lanterns, and replacing all the broken glass. Cleveland has 5591 lamps of 18½-candle power, the cost of which is $17·51 each per annum for 3760 hours' burning. A 4½-foot burner is used, which is provided by the Municipality, who furnish the posts and lanterns, and restore broken glass. The contractor supplies the gas only. Washington has 5701 gas-lamps of 25-candle power. The life of the contract is one year; and the price is $20 per lamp. The lights burn

4000 hours—the contractor taking all care; and the burner used is a 5-feet one. The contractor furnishes the gas and the burners; and the authorities of the city provide the posts, lanterns, and replace broken glass. Baltimore has 5565 gas-lamps of 25-candle power. There is no contract. The City pays at the rate of $1·25 per 1000 cubic feet of gas consumed. A 5-feet burner is used; the City taking all care of the lamps, and furnishing all the fixtures. Lowell has 850 gas-lamps without any contract. The City pays $1 per 1000 cubic feet for the gas consumed. The hours are 1850 per year; the City taking all care of the lamps, and furnishing all the fixtures. Dayton has 1230 lamps of 16-candle power, and pays at the rate of $19 per lamp per annum. A 4-feet burner is used; the burning-time being 3674 hours per year. The contractor takes all care of the lamps, furnishes the gas and burners, and repairs all broken glass; the City furnishing the posts and lanterns. Buffalo has 5800 lamps of 18-candle power on a five-year contract, for which they pay at the rate of $14 67½ per lamp per year on a time-table of 3948½ hours. The entire care of all the lamps is taken by the contractors. The size of the burners is determined according to location, ranging from 4 feet to 6 feet. The contractors furnish the burners and gas, and repair broken glass. The City provides the posts and lanterns. Newton has 885 gas-lamps of 17-candle power on a three-year contract at $16·50 per lamp, burning 2200 hours per lamp per annum. The contractors furnish gas and 4-feet burners, and reglaze; the City furnishing the posts and lanterns. The City of New York had 25,545 lamps before the city proper was merged in Greater New York; the lamps ranging in candle power from 20 to 31. The price paid there is from $12 to $28 per annum, owing to a number of Companies being in the field. The average price of all the Companies is $20·79. The $12 rate is fixed in the charter of the Company by the State Legislature. The number of burning hours is 4000—the contractors taking all care. A 3-feet burner is used. The contractors furnish the burners and gas, and repair all broken glass; they also paint the fixtures when so ordered. The City furnishes posts and lanterns. Boston has 7592 lamps, of 17 to 26 candle power; the price paid ranging from $20·47 to $32·58. The time-table is 3828 hours; the contractors furnishing nothing but gas. A 4-feet burner is used. The City provides all the fixtures, as well as the labour to clean, light, and extinguish. The City of New Haven, with 743 gas-lamps ranging from 18 to 23 candle power, on the new contract pays $22 25; the burning hours being 4000 per annum. The contractors take care of the lamps. A 4-feet burner is used; the contractors furnishing the gas and burners, repairing all broken glass, and painting fixtures when so ordered, the City providing the posts and lanterns.

The following are some of the prices paid by adjoining cities for street lighting by naphtha: Elmira has 463 naphtha lamps of 18-candle power, on a three-year contract, at $27·38 per lamp per year, the lamps only burning until 2 a.m. The contractors furnish oil and fixtures, and maintain the lamps, the City supplying nothing. Lowell has 550 20-candle lamps without any time contract, and pays $25·55 per lamp per annum; burning 1850 hours. The contractor takes all care, furnishes the fixtures, and reglazes the lamps; the City providing only the posts. Washington has 1025 lamps of 18-candle power on a yearly contract, a $20 price, and a 4000-hour schedule; the contractor taking all care, and furnishing all fixtures, except the posts, which are provided by the Municipality. Providence has 1400 lamps of 18-candle power on a three-year contract at $22·50 per lamp. The time table is 4000 hours; the contractor taking all care, and furnishing all fixtures, except the posts, which are supplied by the City. Binghampton has 274 18-candle lamps on a three-year contract at $23·75 per lamp. The number of burning hours is 4000. The contractor takes all responsibility, and furnishes the burners, oil, and oil-tanks; the posts and lanterns being put up by the town authorities. Newhaven has now 510 lamps of 20-candle power at $19·97 per annum on a 4000-hour schedule. The contractor keeps the lamps in order, and furnishes oil, burners, lanterns, and tanks—the City providing the posts.

ELECTRIC LIGHTING NOTES.

In consequence of the continued increase in the demand for the electric light at South Shields, the Electric Lighting Committee have secured the permission of the Town Council to make application to the Local Government Board for their sanction to the borrowing of £20,000 for the purpose of providing additional plant.

One of the amusing illustrations of the unreliability of the electric light with which readers of the "JOURNAL" are familiar occurred at the meeting of the Waterloo District Council last Wednesday. In the course of the proceedings, a letter was read from the Local Government Board intimating that an inquiry would be held into the application of the Council for the purposes of electric lighting. Subsequently, however, as though to demonstrate to the members that they were relying upon an unstable illuminant, the electric light suddenly went out, plunging the Council Chamber into darkness. Fortunately a number of candles were at hand; and these were utilized until the light came on again. This little incident caused considerable amusement among the councillors; one of them, at the close of the meeting, remarking in a humorous vein, that, in accordance with the spirit of the age, he wished to protest against ritualistic practices being introduced into the Council by using candles except for lighting purposes.

A Local Government Board inquiry was held at Yarmouth last Friday with reference to a further loan of £4800 for the extension of the Corporation electric light works. The Borough Surveyor stated that sanction had already been received for £35,200; so that the proposed loan would make £40,000. As to the progress of the works, they were opened in January, 1893, with 700 lamps installed; and there were now 12,500 lamps installed, with applications for 1000 more. The works had not yet earned sufficient to pay the whole of the interest and sinking fund. In the first year the deficit was £700; in the second year, £730; and last year, £411. This year he anticipated there would be no loss whatever. The deficit was paid out of the rates. He declined to call it loss, because he contended they were saving up for future generations. The Inspector (Mr. H. P. Boulnois) said he did not think it proper to burden electric light undertakings from the start with interest and sinking fund. There was no opposition to the application.

Exeter people continue to complain that the electric light in the streets of the city is not all that the fancy of the Corporation painted. It is accused of being erratic and frivolous, while the residents of Queen Street have the additional cause of complaint that it makes such dark patches that their doorways have become depositories of rubbish. Last Wednesday a memorial from those especially aggrieved was presented to the City Council, who passed it on to the Electric Light Committee. Mr. J. W. Williams took advantage of the opportunity to emphasize the complaint that nearly two-thirds of the principal thoroughfares had been in darkness owing to defects in the arc lamps. Alderman Domville, the Chairman of the Electric Lighting Committee, explained that the cause was the breaking of the Jandus globes in the interior of the lamps. These were removed, and replaced with others by the Council's Engineer. The contractors had been communicated with; and the question of how far they could be charged with the defects would be considered later.

At the meeting of the Leeds City Council last Wednesday, the Chairman of the Parliamentary Committee (Mr. Wilson) moved—"That the Corporation, in pursuance of section 59 of the Leeds Electric Supply Order, 1891, do give notice in writing to the Yorkshire House-to-House Electricity Company, Limited, being the undertakers for the purposes of the said Order, requiring them forthwith to sell to the Corporation their undertaking upon the terms contained in sub-section (1) of the said section 59." In doing so, he remarked that, by the Provisional Order they had lately obtained, the Corporation had acquired what had not recently been granted to any corporation—viz., the power to issue irredeemable stock bearing interest at 5 per cent. There might be two opinions as to whether it was advisable to issue such stock; but, in consequence of Lord Justice North's decision in regard to the Sheffield case, it was found to be absolutely necessary, if they were to deal with the Leeds House-to-House Electricity Company on the best terms, that they should at any rate have power to issue 5 per cent. irredeemable stock. The motion was carried.

Last Thursday, the Hampstead Vestry decided to take up a loan of £39,980 from the London County Council (part of £51,500 asked for) "in respect of expenses incurred in buildings, plant, &c., under the electric lighting undertaking;" this loan being repayable in 42 years by annual instalments at 3 per cent. interest, and all repairs and renewals during that term being met by a sinking fund provided for the purpose, or [*sic*] from maintenance account. In this connection, it is interesting to note that this Vestry's electric light capital account now shows a debit balance of £32,356. An interesting debate ensued about a letter from the Solicitors of Mr. Martin D. Rucker, the well-known financier, who alleged that the Vestry have been "infringing certain letters patent in respect of an invention for improvements in distributing electricity and apparatus therefor" of which he is the proprietor. As it appeared that similar claims have been made on many other electric lighting undertakings, and that legal proceedings have already been commenced against the London Electric Supply Corporation, Limited, the Vestry decided, as recommended by their Committee, to join with other corporations and companies in defending the action; and they empowered the Vestry Clerk to take all necessary steps in the matter.

A conference of Corporations and Vestries who are members of the Municipal Electrical Association was held last Friday afternoon at the Westminster Palace Hotel, under the presidency of Mr. A. H. Gibbings, of Bradford, to consider their course of procedure with reference to the action referred to in the preceding paragraph. Some fifty Corporations and other bodies throughout the country are concerned; and it is understood that, if the action is successful, proceedings will be taken against each of the other Local Authorities owning electric lighting undertakings. Representatives were present from Blackpool, Huddersfield, Bolton, Halifax, and South Shields. The proceedings were private; but reporters were officially informed that a resolution was passed agreeing to combine to assist the London Electric Supply Corporation in defending the action; and, if necessary, to carry the case to the House of Lords.

The prospective litigation already alluded to caused a depression in a large number of electric lighting shares early last week; and some exclusive information on the matter published by one of the London evening papers was confirmed the next day by the "Statist," which gave the following explanation: "We understand from an authoritative source that a serious litigation under the patent laws threatens a large number of electricity supply undertakings. In the year 1835, a patent was granted for this country to Messrs. Zipernowsky and Deri, of Buda Pesth, in respect of their method for the distribution of high-tension electrical energy by means of induction transforming devices, which reduce the current to a lower pressure suitable for use on consumers' premises. This patent, which, we understand, has been bought up by a Syndicate, has recently been amended—of course, making it more favourable to the patentees; and it is claimed that it controls the systems of distribution in use by all the electricity works in the country where the alternating-current system is in use, comprising more than half the works now in operation. At any rate, notices have been served on all these works, alleging an infrigement of the patent, claiming damages for the unauthorized use of the invention, and demanding an undertaking to discontinue the use until a licence has been secured. The works using the low-tension system are not affected—such as, for instance, the Westminster, St. James's, Kensington, Charing Cross, and Notting Hill Companies. In the case of the London Electric Supply Corporation, Limited—one of the largest concerns in the kingdom—the matter has advanced to the writ stage; so that it is evident the owners of the patent intend to bring the matter to an issue. Should the result of the action sustain the claims of the patent, the works involved will have on hand a question of royalty of serious importance. In the cases of the large concerns, such as the London Electric, the Metropolitan Company, the City Company, the House-to-House Company, and the provincial companies at Leeds, Newcastle, and Sheffield, the royalties would, without a doubt, amount to a very considerable sum; and the Companies may be compelled to submit to whatever terms were dictated. In the majority of cases, the changing of the system is practically out of the question, on account of the large amount of capital expended on plant and transforming apparatus peculiar to the alternating system. It is estimated that up to the present about £8,000,000 sterling has been expended on works employing the high-tension alternating-current system, of which probably not less than £1,000,000 has been spent in transforming apparatus alone,

THE NEW WATER-WORKS FOR SHEFFIELD.

Progress of the Langsett Reservoir.

The members of the Water Committee of the Sheffield Corporation, accompanied by the Mayor (Mr. H. Sayer), the Chairman of the Committee (Alderman Gainsford), the General Manager of the water-works (Mr. W. Terrey), and the Resident Engineer (Mr. Watts), recently visited the new storage works which are being constructed in the Little Don Valley. The Langsett reservoir, it may be remembered, is being carried out jointly by the Corporations of Sheffield, Rotherham, and Doncaster; and 500 men are now engaged upon the work. Operations have been going on for seven or eight months. The discharge tunnel, which was begun in January, is one of the most interesting parts of the work. The whole length of 340 or 350 yards has been driven—5000 cubic yards of earth having been excavated; and about 180 yards of it is arched and bricked. In the remaining portion, the work has reached different stages. In some places all the excavation is finished, and only requires the attention of the bricklayers; in others, the boring is in an incomplete state. The excavation is principally through shale; no coal having been met with. The nearest seam runs out at Bridgeholme, a little distance away, and overlies the shale strata in which the central core of the embankment is being sunk. Through the tunnel, 9 feet high and 9 feet wide, the whole water of the reservoir, except the overflow, will pass. Entering partly by one mouth of the tunnel in the reservoir, and partly by means of valves at higher levels, the water will flow unchecked until it reaches the bottom of the valve-shaft, where the discharge will be regulated. The shaft is a pit some 65 feet deep, 14 feet square at the bottom, and 12 feet in diameter at the top, situated midway along the tunnel. At the bottom will be three valves, for dealing with the water which runs in from the lower depths of the reservoir; and at two points in the descent—one 26 feet and the other 33 feet from the surface—two other valves, for admitting the higher supply. The latter, of course, will be in most constant use. About 30 feet of the upper limits of the reservoir is really the working capacity. It will not be necessary to go below this (the reservoir has an average depth of about 90 feet) except in case of drought. Yet the lower valves should be kept in order; and they will be worked at least once a month. Mr. Watts is making provision, by the construction of a tank to hold 28,000 gallons, for exercising the valves by hydrostatic pressure, instead of by manual labour only. After passing through the valves, the water enters the pipes which convey it to the outlet of the tunnel, and to the mains.

The puddle trench, begun last November, is another part of the works with which good progress has been made. Its total length will be 600 yards; and 260 yards have now been opened out—about 16,000 cubic yards having been excavated. The embankment will contain 800,000 cubic yards; and 71,500 cubic yards of puddle are required. The depth of the trench, which will be filled up by a solid concrete wall, is about 80 feet; and in making it there is found abundant evidence that, though the Little Don runs down the valley in only a narrow stream, there is an abundance of water in the neighbouring ground. The embankment will be 630 feet wide at the base; and the foot of it has now been put in, but not yet faced with stone.

A prominent object in the valley is a long temporary viaduct, which has been erected for the purpose of conveying the earth excavated from the trench. Three steam-cranes and three stone-breakers are at work, and there are three locomotives and five portable engines. Tramways have been laid down all over the works; there are 3½ miles of them. The accommodation railway, connecting the water-works with the Stocksbridge Railway three miles away, is approaching completion. The works, it is expected, will be completed about four years hence. Then the wooded slopes of the hills will be submerged; the huge embankment which is now marked out in profile will dam up the water; and a reservoir, 120 acres in extent, capable of holding 1400 million gallons of water drawn from a drainage area of 5203 acres, will have been added to the other storages of Sheffield. Great as the capacity of the reservoir will be, a rainfall of 12 inches on the gathering-ground will be sufficient to fill it.

Following the above visit, the Water Committee, with several other members of the Council, last Wednesday made a tour of inspection round the reservoirs, in the Loxley Valley. This watershed is the largest possessed by the Corporation, and contains four reservoirs—Damflask, Agden, Dale Dike, and Strines. None of them are as big as the huge dam now being made for the storage of the waters of the Little Don, though the Damflask reservoir approaches it in size, having a capacity of 1158 million gallons, as compared with the 1400 millions which Langsett will hold. But the size of the whole works is nearly twice as large as that of Langsett—the four reservoirs, when full, containing 2786 million gallons. Together, they form the low-level system of the Sheffield supply; the high-level system consisting of the reservoirs at Redmires and Rivelin, which drain from a much smaller watershed, and have an aggregate capacity of 901½ million gallons. The reservoirs were found by the visitors to be remarkably well filled for this time of the year.

LOCAL AUTHORITIES AND THE UPPER WATERS OF THE DERWENT.

The right of Leicester to the upper waters of the Derwent is not to go unchallenged, as other towns have designs on the same source for augmenting their water supplies. According to a report which was presented to the Derby Town Council last Wednesday, the Water Committee have come to the conclusion that the promotion of a Bill for obtaining a supply from the river named can no longer be deferred. In their judgment, too, any action in the same direction on the part of other local authorities should be strongly opposed, and their opinion is shared by the Derbyshire County Council. The Town Council agreed with the Committee, and empowered them to take the necessary steps to promote a Bill for obtaining an additional supply of water from the Derwent. Meantime, ratepayers

GAS AND WATER COMPANIES STOCK AND SHARE LIST.

Referred to on p. 299.

Issue.	Share	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.	Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.	£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 15	10½	Alliance & Dublin 10 p. c.	23½–24½	..	4 5 9	75,000	5	June 29	6	Malta & Medn., Ltd.	4¾–5¼	..	5 14 3
100,000	10	,,	7½	Do. 7 p. c.	16–17	..	4 8 3	541,920	20	June 10	5	Monte Video, Ltd.	14–15	..	6 13 4
300,000	100	July 1	5	Australian 5 p. c. Db.	105–107	..	4 13 6	617,946	Stk.	Feb. 24	9⅜	Newc'tle & Gatesh'd Con.	235–240	..	4 1 3
200,000	5	May 26	6	Bombay, Ltd.	6½–6¾	..	4 8 11	252,355	Stk.	Jan. 3	3½	Do. 3½ p. c. Db. Stk.	113–117	–2½	2 19 10
40,000	5	,,	6	Do. New, £4 paid	4½–5	..	4 16 0	150,000	5	May 26	8	Oriental, Ltd.	7¼–7⅜	..	5 8 3
380,000	Stk.	Feb. 24	12	Brentford Consolidated	280–285	..	4 4 3	135,000	5	,,	8	Do. New, £4 10s. pd.	6–6¼	..	5 10 9
240,000	,,	,,	9	Do. New	215–220	..	4 1 10	15,000	5	,,	8	Do. do. 1879, £1 pd.	1½–1¾	..	4 11 5
50,000	,,	,,	5	Do. 5 p. c. Prf.	140–145	..	3 9 0	60,000	5	Mar. 11	7	Ottoman, Ltd.	5–5½	..	6 6 2
159,375	,,	June 10	4	Do. 4 p. c. Db. Stk.	130–135	..	2 19 3	500,000	100	June 1	6	People's Gas | 2nd M. of Chicago | Bd.	103–108	..	5 11 1
220,000	Stk.	Mar. 30	11½	Brighton & Hove Orig.	268–273	..	4 4 3								
218,820	,,	,,	8½	Do. A. Ord. Stk.	195–200	..	4 5 0	848,070	10	May 26	6	River Plate Ord.	9–9¼	..	6 6 4
933,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max.	127–132	..	3 15 9	250,000	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	97–99	..	4 0 10
420,000	20	Ma . 30	11½	British	53–55	..	4 1 9	250,000	10	Apl. 29	10	San Paulo, Ltd.	15½–16½	..	6 1 3
50,000	10	Mar. 11	11½	Bromley, Ord. 10 p. c.	25–27	..	4 5 2	135,000	Stk.	Mar. 30	10	Sheffield A.	245–248	..	4 0 8
75,000	10	,,	8½	Do. 7 p. c.	20–22	..	3 17 3	209,053	,,	,,	10	Do. B.	245–248	..	4 0 8
500,000	10	Apl. 29	6	Buenos Ayres (New) Ltd	9–9¼	..	6 6 4	447,427	,,	,,	10	Do. C.	245–248	..	4 0 8
98,122	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	98–100	..	4 0 0	5,213,168	Stk.	Feb. 24	5½†	South Metrop., 4 p. c Ord.	143–146	+1	3 13 0
150,000	20	July 14	8½	Cagliari, Ltd.	30–31*	..	5 6 5	1,185,846	,,	July 14	3	Do. 3 p. c. Db. Stk.	100–103*	..	2 18 3
100,000	10	June 10	7	Cape Town & Dis., Ltd.	15–16	..	4 7 6	60,000	Stk.	Mar. 11	12	Tottenham and | A.	285–295	..	4 1 4
50,000	50	May 3	6	Do. 6 p. c. 1st Mort.	58–60	..	5 0 0	60,000	,,	,,	9	Edmonton | B.	205–215	..	4 3 9
550,000	Stk.	Apl 15	13½	Commercial Old Stock	315–325	..	4 3 1	182,380	10	June 10	7	Tuscan, Ltd.	12½–13½	..	5 8 8
200,750	,,	,,	10½	Do. New do.	252–257	..	4 1 8	149,900	10	July 1	5	Do. 5 p. c. Dbs. Red.	100–103	..	4 17 1
200,750	,,	June 10	4½	Do. 4½ p. c. Lb. dc.	148–153	..	2 18 10								
800,000	Stk.	June 10	12	Continental Union, Ltd.	207–212	..	5 13 2								
200,000	,,	,,	9	Do. 7 p. c. Prf.	197–202	+2	4 9 1					WATER COMPANIES.			
51,600	Stk	Feb. 24	14	Croydon A 10 p. c.	310–315	..	4 8 11	746,164	Stk.	June 29	10½	Chelsea, Ord.	313–318	..	3 6 0
168,400	,,	,,	11	Do. B 7 p. c.	255–265	..	4 3 0	150,000	,,	,,	5	Do. 5 p. c. Prf.	170–175	..	2 17 2
555,000	Stk.	Feb. 24	5½	Crystal Palace Ord. 5 p. c.	127–132	..	3 19 7	160,000	,,	,,	4½	Do. 4½ p. c. Pf. Stk., 1875	148–152	..	2 19 3
60,000	,,	,,	5	Do. 5 p. c. Prf.	142–145	..	3 9 0	175,785	,,	Mar. 30	4½	Do. 4½ p. c. Db. Stk.	157–162	..	2 15 7
486,090	10	July 28	11	European, Ltd.	23–24*	..	4 11 8	1,720,560	Stk.	Apl. 15	8	East London, Ord.	227–232	..	3 9 0
354,060	10	,,	11	Do. £7 10s. paid	16½–17½*	..	4 14 4	654,740	,,	June 29	4½	Do. 4½ p. c. Db. Stk.	157–160	..	2 16 3
5,922,230	Stk.	Feb. 10	12½†	Gaslight & Coke, A, Ord.	295–300	–2	4 1 7	390,000	,,	,,	3	Do. 3 p. c. Db. Stk.	103–105	..	2 17 2
100,000	,,	,,	4	Do. B, 4 p. c. max.	120–125	..	3 4 0	700,000	50	June 29	7½	G'd Junct'n, 10 p. c. max.	115–118	..	3 3 7
665,000	,,	,,	10	Do. C, D, E, 10 p. c. Prf.	303–313	..	3 3 11	310,000	Stk.	Mar. 30	4	Do. 4 p. c. Db. Stk.	142–147	+2	2 14 5
80,000	,,	,,	5	Do. F, 5 p. c. Prf.	154–158	..	3 3 3	708,000	Stk.	Feb. 10	14†	Kent	360–365	..	3 16 9
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	230–240	..	3 2 6	160,000	,,	,,	7	Do. New, 7 p. c. max.	218–218	..	3 4 3
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	195–200	..	3 10 0	1,043,800	100	June 29	10	Lambeth, 10 p. c. max.	298–303	..	3 6 0
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	308–313	..	3 3 11	406,200	100	,,	7½	Do. 7½ p. c. max.	227–232	..	3 4 8
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	184–188	..	3 3 10	350,000	Stk.	Mar. 30	4	Do. 4 p. c. Db. Stk.	140–145	..	2 15 2
1,061,150	,,	June 10	4	Do. 4 p. c. Db. Stk.	131–133	..	3 0 2	500,000	100	Feb. 10	13	New River, New Shares	432–437	..	2 19 6
294,850	,,	,,	4½	Do. 4½ p. c. do.	148–153	..	2 18 10	1,000,000	Stk.	July 28	4	Do. 4 p. c. Db. Stk.	140–145*	..	2 15 2
958,000	,,	,,	6	Do. 6 p. c. do.	198–203	..	2 19 1	902,300	Stk.	June 29	6	Southw'k & V'xhall, Ord.	166–171	+3	3 10 2
70,000	10	May 12	8	Hongkong & China, Ltd.	13½–14½	..	5 10 4	126,500	100	,,	6	Do. do. 7½ p. c. max.	157–162	+2	3 14 1
3,800,000	Stk.	,,	10	Imperial Continental	210–215	..	4 13 0	489,200	Stk.	,,	5	Do. do. 5 p. c. Prf.	168–172	..	2 18 2
376,400	100	Aug. 2	4	Do. 4 p. c. Dbs. Red.	98–101*	+2	3 19 3	1,019,585	,,	Apl. 15	4	Do. 4 p. c. A Db. Stk.	141–144	..	2 15 7
473,600	Stk.	Feb. 10	8½	Do. 3½ p. c. Db. Stk.	103–106	..	3 6 0	1,155,066	Stk.	June 10	10	West Middlesex	297–302	..	3 6 3
560,000	100	Apl. 1	5	Met. of Mel- | 5 p. c. Db.	110–112	..	4 9 3	200,000	,,	,,	4½	Do. 4½ p. c. Db. Stk.	162–165	..	2 14 7
250,000	100	,,	4½	bourne | 4½ p. c. Db.	107–109	..	4 2 7	200,000	,,	Mar. 11	8	Do. 8 p. c. Db. Stk.	104–106	..	2 16 7
					* Ex div.								* Ex div.		

† Next dividend will be at this rate.

of Leicester have had the present position and the prospects of the water supply of the town laid clearly before them, in a long letter to the press, by Mr. Edward Wood, the Chairman of the Water Committee. Alluding to the scheme for obtaining a supply from the Rivers Derwent and Ashop, he says: "Here we have extensive moors forming the south of Yorkshire and the north of Derbyshire, with admirable gathering-ground, with no cultivation and practically no population, and no mining; the rocks are sandstone, and the water of great purity and softness, as shown by analyses. . . . The gathering-ground of this watershed is about 31,000 acres in extent; and the rainfall during the past dry years has averaged over the whole district about 40 inches per year. This is compared with about 24 inches of rainfall in Leicestershire during the same period. The volume of water to be obtained from this district is so large that, after making ample calculation for the compensation water that would have to be sent down the river, it is estimated that if Leicester obtained one-third of this supply, we should have enough water to provide the growing population of the town, calculated on the basis I have referred to, up to the year 1950. As to the cost, it is impossible to estimate what that would be; it depends largely upon the number of partners we should have in the scheme, and also upon the extent of the share of water we obtain. I may here state that up to the present time the water undertaking of the town (since it became the property of the Corporation) has never been any burden to the ratepayers; but in addition to paying its own working expenses, interest on capital, provision for sinking fund to pay off capital debt, it has handed over the handsome sum of £96,996 in reduction of the rates of the borough. If we obtain from Parliament a share of this North Derbyshire water, we should commence to expend capital about the year 1905, and to such an extent as would give us an additional water supply of 4 million gallons per day (or nearly as much as our present consumption), and which would last without further expenditure to 1923. In 1923 we should have to commence to expend a further amount of capital to provide a still further 4 million gallons a day, to be ready for use after the year 1927; and the last capital expenditure would commence about 1937. So that if the town did not grow in population as has been estimated, further additional outlays beyond the first 4 million gallons could be abandoned or regulated according to the needs of the population. The growth of the profits of our Water Department have averaged in the past something like £2000 a year; and there is no reason why they should not continue to increase."

American Water-Pipes for Hull.—The Hull Corporation Water-Works Committee have accepted the tender of an American firm for cast-iron pipes, with faced flanges, at £5 2s. per ton, which is 1s. 3d. per ton cheaper than the next lowest tender, while the pipes are 3 feet longer.

Heavy Waste of Water at Ormskirk.—A special meeting of the Ormskirk District Council was held last Tuesday to consider a report by the Surveyor respecting the waste of water in the town. It was stated that the waste was above 40 per cent. of the total quantity pumped, but that this was less than it was five years ago. It was resolved that legal proceedings be taken where cases of wilful waste were detected.

NOTES FROM SCOTLAND.

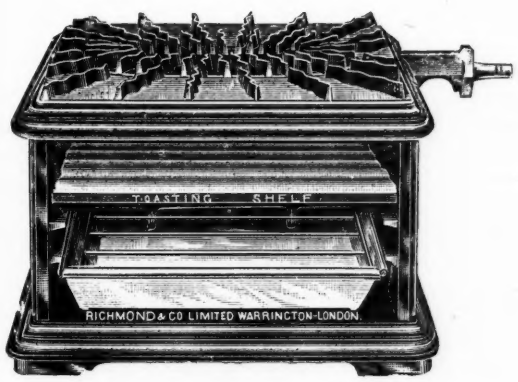
From Our Own Correspondent.

Saturday.

I have received from Mr. James Fleming, the Treasurer to the Glasgow Corporation Gas and Electricity Departments, copies of the carefully prepared accounts of the undertakings for the year ending May this year. I have already given a sufficiently full account of them, and have nothing to add. With reference to the increased revenue from residuals, I find that the increased quantity of coal which was carbonized almost accounts for it; so that the circumstances are not peculiar to Glasgow. There is another point which it may be of interest to bring out. That is an expenditure of £537, stated as "miscellaneous charges and accidental damages." It is not possible, on account of the wages not being given separately in the distribution department, to say accurately what the total outlay in wages to workmen was; but in the manufacturing department they are stated to have amounted to £86,330. The whole £537 was not expended in respect of accidents. If we take £500 as the sum—which is probably too high—it is found that accidental damages cost the Corporation at the rate of about 12s. per cent. of the wages paid in the gas-making department. This, I know, is over the mark; it was most probably under 10s. per cent. Even though the Workmen's Compensation Act should double the amount payable by the Corporation for accidents, it would not amount to 20s. per cent. of the wages. This lets light in upon the claims of the Insurance Companies. They, I suppose, did not estimate for gas-works alone in their quotations, but put the whole liabilities under all occupations together, and then averaged them; thus making owners of gas-works, in which the accident roll is light, pay for claims in more dangerous occupations.

I can give more accurate figures from the Edinburgh and Leith Gas Commissioners' accounts. The wages paid there to men in the works and to workmen in the distribution departments amounted last year to £48,038; and the amount paid as damages for accidents was £170. This works out at 7s. per cent. of wages. It cannot be expected that the sum paid every year would be so low as £170; but the rate compares very favourably with the 25s. per cent. asked by the Insurance Companies.

The following is the report of Mr. W. Foulis, of Glasgow, to the Perth Gas Commissioners, upon their new works: "It would appear from the statements supplied to me that the total amount you are authorized to borrow for the construction of your new works is £52,500, of which sum there has already been spent £17,007 6s. 1d., and contracts have been entered into amounting to £13,879 19s. 3d.; so that there remains a sum of £21,612 14s. 8d. available for the completion of the works. It is to be regretted that complete plans of the works were not prepared before any contracts were entered into, as the cost of construction would thereby have been considerably reduced. Plans have now been prepared of the completed works. These have, of necessity, been designed to utilize the material already contracted for. The only alteration is in the contract for the retort-bench and mountings, &c.; the original contract being for a much more extensive plant than I consider is necessary. The works as designed are of the following capacity: The retort-house is of sufficient



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dimensions to contain 240 retorts, each of which, if the settings are properly constructed, should be capable of producing 8500 cubic feet in 24 hours, giving a total manufacturing power of 2,000,000 cubic feet per day. It is proposed to erect only 128 retorts at present, which will be capable of making 1,100,000 cubic feet in 24 hours, or about 36 per cent. more than the greatest quantity made at the existing works last winter. The rest of the apparatus will be more than sufficient for dealing with this quantity of gas, and is so arranged that the different parts may be extended from time to time, as required, at a minimum cost. The railway sidings are arranged so that the coal will be delivered into the coal-stores at a height considerably above the floor level. This will facilitate storing, and will enable the coal to be filled into a hopper, from which it will fall by gravitation into the coal-breaker, so that only the coal which it is necessary to store will require handling a second time. These plans have been placed in the hands of a measurer, who has made an estimate of the probable cost of the buildings, &c.; and having carefully gone over the various items, I am fully convinced that the cost of completing the work would not exceed £21,000. Permit me to point out to you that this will exhaust your borrowing powers, and that further extensions will have to be provided for, either from any sum which may be obtained from the sale of the existing works or by obtaining additional borrowing powers. Seeing much of the plant to be erected at the new works is in reality in substitution for the plant at present in use at the existing works, but which will become practically valueless when the new works are completed, might I be allowed to suggest for your consideration whether it is advisable to charge the whole cost of the new plant to capital, or only a proportion of the cost, which would represent the additional capacity and efficiency of the new plant, based, of course, on the depreciated value of the old works. I enclose tracing showing ground plan of proposed works. Should this meet with your approval, specifications and schedules of quantities should at once be prepared, and estimates obtained for the execution of the works." The report was read to the Commissioners at a meeting on Thursday night; and consideration of it was held over. An account has been lodged by Mr. G. P. K. Young, architect, claiming payment for the preparation of plans for part of the new works. There seems to be some doubt as to who employed Mr. Young; and the Commissioners have appointed a Committee to consider the matter, and also the whole question of the employment of tradesmen at the gas-works.

The municipal barometer at Forfar has been at "stormy" all the week. The annual gas accounts have been a bone of contention for some time—indeed, for some years. This year the violence (in language, of course) has been more pronounced than ever. On Monday night, when the Gas Committee met to consider the accounts, Mr. Christie, who is the leader of the opposition, at once drew attention to an alleged discrepancy between the recently published statement of accounts and the copy which had been laid before them as audited and certified to be correct. Provost M'Dougall admitted that there was something wrong with the first copy. Bailie Patullo, the Convener of the Gas Committee, made a long explanation with reference to the accounts, which I cannot understand, but which seemed to point to the fact that the Commissioners have a contingent fund handy, out of which they can, if they choose, defray any extra outlay which may occur. Thus, in the course of the past year, a sum of £300 was expended upon a new boiler and other plant; and this sum has been taken from the contingent fund. But the Committee's proposal was to charge it out of revenue; and in this way there was a deficit on the year's working. The deficit first brought out amounted to £200. When the Corporation met on Monday, however, it had been reduced to £130. Something had been omitted from the first balance-sheet, and was now inserted. According to the Convener, the accounts of the Corporation have not, at least for the past eight years, been prepared according to form; the full statutory contributions to the sinking and other funds not having been made. This has now been attended to, apparently, though it was not stated definitely. Arrears which have been accumulating for years have been wiped off, to the amount of £124. When all this has been done, there is a deficit; but the Convener argued that upon the year's working, had the accounts been stated in the old way, there would have been a surplus of £700. Defalcations are not alleged, and are not entertained; and it is a satisfaction to know that an effort is being made to place the gas finances of the town on a proper footing. Such things are easier attempted than effected. When once methods which are not strictly accurate creep in, it is difficult to eradicate them. Mr. Forbes Waddell, during the five years he has been Manager at Forfar, has been striving to consolidate the undertaking; and now he seems to be nearer the goal than ever. In Bailie Patullo he has got a new Convener, who is evidently of the same mind as himself. This being so, the natural expectation would have been that they would have received all the assistance possible from every member of the Corporation. But they do things differently in Forfar. There is Mr. Doig, who was Provost of the town for years, Mr. Christie, and Mr. Craik. It suited their book to take up the attitude that the accounts had been juggled; and they pressed for the calling in of an accountant to examine the books of the undertaking. Their motion to this effect was only supported by themselves; and the accounts were adopted. Two evenings, however, were spent over the process; and there was a good deal of heated discussion—such expressions being used as "deliberate untruths," "not true," and "hold your tongue, sir." Mr. Waddell has had much to endure since he went to Forfar; and I can well imagine that he must feel it to be the unkindest of all the treatment he has received, that when he and the Convener are endeavouring to make matters straight, they should be met with contumely and invective. The incident would appear to be not yet over, for Mr. Christie has given notice of motion to the effect that an accountant be appointed to examine the books. It is surely a melancholy exhibition of incapacity on the part of public men, that they cannot examine them for themselves.

Delusions die hard. What appears to be the expiration of one took place at Stirling this week. For some time, under the guidance of an ex-Provost of the burgh, a portion of the community have been deluded into the notion that they could light the town with electricity generated by the overflow water in the town reservoirs. A local civil engineer encouraged the idea; but when cold reasoning was turned upon it by Mr. James Wilson, Engineer to the Edinburgh and District Water Trust, the fancied merits of the scheme vanished. At a meeting of the Committee

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in charge of the proposal, held on Tuesday, it was resolved to proceed no further with the matter. The ex-Provost was absent. Probably the suggestion was never intended to be proceeded with, but to be used as a depreciation of the gas industry in the town at the time when the Stirling Gas Company were in Parliament. Now that they have obtained their Act, the electricity proposal is dropped.

The Town Council of Aberdeen this week received a report by the Committee which opposed the Great North of Scotland Railway Bill in Parliament, giving a narration of their opposition, and of its results. Very significantly, the report was adopted without comment. The Corporation were not successful in their opposition.

I learn that the Greenock Corporation Gas Department have closed a year which has been more than usually successful. The Corporation act on the pernicious principle of plundering the gas profits for the benefit of the Municipality; and this year they have so abstracted £1000, to be applied to police purposes. In addition, it is reported, they have a surplus in the gas funds to the amount of several hundreds of pounds. Greenock has been badly hit in recent years by the depression in the sugar industry; consequently these figures are welcome, as they point to returning prosperity to the town.

The West Kilbride Gas Company have paid a dividend of 4 per cent., and reduced the price of gas by 5d. per 1000 cubic feet.

At the annual meeting of the Penicuik Gas Company, on Wednesday, the report of the Directors, which was adopted, stated that after provision for the usual 5 per cent. dividend to the preference shareholders, the surplus at the credit of profit and loss account amounted to £470. They recommended that the dividend for the year be one of 6 per cent.; leaving a balance of £110. In consequence of the large expenditure in 1896-97 for renewal of pipes, met out of revenue, the Directors had not considered it expedient on this occasion to increase the depreciation account. They hoped, however, at the end of the current year to resume the practice adopted in former years, of setting aside a proportion of such profits as might be earned as a depreciation fund.

The water supply provided by the Edinburgh and District Water Trust has been so seriously affected by the exceptionally dry weather which has prevailed, it may be said since last summer, that the Trust are advertising an urgent request to the community to be sparing in the use of water. They cannot, they say, maintain the present consumption. In connection with the subject of what they consider to be waste of water, the Trustees have discovered that the Burgh Engineer's Department, which has charge of the drainage of the City of Edinburgh, have been using a spray of water in manholes leading to the main sewers, for the purpose of preventing noxious gases from rising. From the terms of a report by their Superintendent, which the Trust had before them at a meeting last Thursday week, it would seem that in this matter the Sanitary Authorities rather took advantage of the Water Trust officials. The application, according to the Superintendent, was for three experimental stations to be tried; but it had been found that as many as 54 had been started, and that, instead of a small quantity of water being used, each of these deodorizers was consuming water at the rate of 470 gallons per hour, or about 610,000 gallons per day in all. The Trustees at once ordered the practice to be stopped. The accounts for the year ending May 15 were before the Trustees. Ex-Provost Wood, Portobello, in moving their adoption, said that the estimated expenditure for the past year was £101,241, and the actual expenditure £104,300, being an excess of £3059. This was accounted for by outlays for alterations on pipes, occasioned by the tramway cabling operations, and had been in part repaid. The revenue from water-rates was estimated at £95,741, while the actual receipts amounted to £97,151—an excess of £1410—equal to 1·47 per cent. This percentage would have been very much increased could all the consumers by meter have had a full supply during some parts of the year. The revenue derived from alterations to piping due to the tramway cabling operations, from rents, pipe joinings, and miscellaneous receipts was £7002, which, added to the revenue from water-rates of £97,151, made the total receipts for the year £104,153. Comparing the receipts from water-rates for the year 1897-98 with those of the previous year, while the estimated increase was 1·11 per cent., the actual increase amounted to £2468, or 2·60 per cent., and this notwithstanding the occasional restricted supply through meters. Regarding the collection of water-rates for the year 1897-98, on the charge of £97,353 there was actually collected £96,982; the abatements and irrecoverables amounted to £263; and the arrears carried forward to this year's account, to £108. Deducting the abatements, amounting to £191, the percentage collected was 99·81. The irrecoverable water-rate for the year was £72. On the year's working, the estimated excess of expenditure over income was £2110, while the actual expenditure exceeded the revenue only by £147, notwithstanding there was extra expenditure under the heading of distribution pipe renewals. There had been a large expenditure during the year on account of new works, the total sum paid being £118,310, of which £99,369 was applicable to the Talla scheme. The total amount paid on account of the Talla works to Whitsunday last was £194,497. During the year loans on mortgage to the amount of £95,749 were renewed for periods of three, five, or seven years, at 2¾ per cent.; and to meet loans on mortgages falling due and for additional borrowing, the sum of £167,928 was raised at 2½ and 2¾ per cent. for the three different periods. The sum required at Whitsunday was not raised in whole; but to meet payments due then £70,000 was borrowed from the bank on short loan. Notwithstanding the increased expenditure, the Treasurer did not anticipate any rise of the present domestic rate of 5d. per £1 in the immediate future, as the balance at the credit of the revenue account, which had accumulated from year to year, amounted to £27,020—affording a margin for any excess of expenditure over income for some time to come. The accounts were adopted.

Pontypridd Water Company's Dividend.—On the recommendation of the Directors, the shareholders of the Pontypridd Water Company have declared a dividend of 8 per cent. on the ordinary shares for the past half year, and 5⅞ per cent. on the new ordinary shares. This is a reduction on the previous half year of 1 per cent. on the ordinary and $\frac{7}{10}$ per cent. on the new ordinary shares; the falling off being attributed to the protracted strike in the coal trade.

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CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 6.

Sulphate of Ammonia.—The week having been broken by holidays, the market has been quiet. But prices have been maintained; and the parcels offered have found a ready sale at full values. The position in general remains sound. A fair portion of the small August production being already sold, a restricted quantity only will be available to fill uncovered contracts, and to supply any fresh requirements. Already a rather better inquiry has sprung up during the last few days from consumers direct; and at the close there is more disposition generally to operate. Quotations are £9 10s. f.o.b. Leith, £9 7s. 6d. to £9 8s. 9d. f.o.b. Hull, and £9 11s. 3d. f.o.b. Liverpool. Business in forward delivery is not reported; and quotations are unchanged.

Nitrate of Soda.—Market firm, at 7s. 6d. to 7s. 9d. per cwt., according to quality.

LONDON, *Aug.* 6.

Tar Products.—The slump in benzols continues; and business is reported to have been done in both 90's and 50's at 9d. per gallon by urgent sellers. The large makers will not sell at this price; and it is not impossible that, in the case of the sale mentioned, the quality may have had something to do with the low price. Anthracene shares with benzol and some of the other products the extreme depression now prevailing. A good business is reported in pitch; and the quotation marked below has been realized for high qualities, while for poorer grades, and less convenient ports, lower figures have been taken. Creosote is not quite so firm; but makers' stocks were never lower than they are to-day. Carbolic acid is steady, with a fair business doing; while there is again more inquiry for naphthalene, which is somewhat scarcer.

The week's values may be taken as follows: Tar, 12s. to 15s. Pitch, east coast, 23s. 6d.; west coast, 19s. Benzols, 90's and 50's, 9½d. Toluol, 1s. Solvent naphtha, 1s. 2d. Heavy naphtha, 1s. 1d. Crude, 30 per cent., naphtha, 1s. 2d. Creosote, 2½d. Heavy oils, 42s. 6d. Carbolic acid, 60's, 2s. Naphthalene, pressed, 55s.; salts, 30s. Anthracene, "A," 4½d.; "B," 3½d.

Sulphate of Ammonia has enjoyed a brisk market during the past week; and large sales have been effected at good prices. There is a distinct firmness both for prompt and futures. Stocks are low, and nitrate producers are firmer; and it may be that sulphate will yet see higher quotations. The business of the week may be marked at £9 8s. 9d. to £9 11s. 3d., less 3½ per cent., at all ports.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—Business moves on steadily in the coal trade of this district, without any really material change to notice as regards the position last reported. The better qualities of round coal suitable for house-fire purposes, though just now in exceedingly slow request, are maintaining their price, with a probability that when the demand for the ensuing winter sets in there may be some upward move. All other classes of fuel are in brisk request for steam, forge, and general manufacturing purposes; and prices for these are very firm, with a hardening tendency, especially on contracts for forward delivery. At the pit mouth quoted prices average 10s. to 10s. 6d. per ton; Pemberton four-feet and seconds Arley, 8s. 6d. to 9s.; common house coal, 7s. 6d.; and steam and forge qualities, about 7s. Engine classes of fuel are moving away readily, with supplies about equal to requirements, although some collieries are rather short; and here and there advances of 3d. per ton are being got upon last month's prices. At the pit mouth common slack averages 3s. 6d. to 3s. 9d. per ton; medium, 4s. to 4s. 3d.; and best sorts, 4s. 6d. to 5s. For shipment, there is an active inquiry with slightly better prices being got. Good qualities of steam coal range from 8s. 9d. to 9s. 3d. at the pit mouth. It is only in special cases where under these figures is being taken.

Northern Coal Trade.—There is a very strong demand for steam coals, and a good inquiry for gas coals; while prices are irregularly advancing under the influence of the increased consumption and the rather reduced production. A series of local holidays have reduced the production of coal, and thus tended to produce a higher range of prices. Best Northumbrian steam coals have varied from 14s. to 16s. per ton f.o.b.; second class coal is about 12s. 6d.; and steam smalls are 7s. In the gas coal trade, the tendency is towards higher prices. For occasional cargoes 10s. per ton f.o.b. is quoted; while one or two contracts are believed to have been settled for next year at about 9s. Some of the large companies are now pressing for delivery of the quantities contracted for; so that they are apparently beginning to stock while the freight is moderate by sea. Other kinds of coals show no alteration. Gas coke is steady; prices being unaltered, and stocks low at works near navigable waters, as the exports are fairly large.

Scotch Coal Trade.—Trade conditions have returned to their normal, after the holiday season. The output has also gone up with a bound. With the present demand, there will be little likelihood of stocking at pitheads. The consequence is that, for the present, prices are tending to firmness; and the prospect is that rates will rather go up than down. The settlement of the Welsh dispute might, however, be followed by a decline in prices. The prices quoted are: Main, 9s. 6d. per ton f.o.b. Glasgow; ell, 10s. to 10s. 6d.; splint, 9s. 9d. The shipments for the week were very large; there being increases of nearly 20,000 tons in the Clyde district, and of 11,000 tons in the Forth district. In the Fife district, there was a decrease of 1500 tons. For the week, the total shipments were 190,228 tons—an increase of 30,144 tons upon the previous week, and of 7581 tons upon the corresponding week of last year. For the year to date, the shipments have been 5,362,164 tons—an increase upon the same period of last year of 950,775 tons.

Manchester Corporation Water Supply.—The abstracts of accounts of the City Treasurer of Manchester for the financial year ending March 31, 1898, show a profit of £6342, whereas for the preceding year there was a loss of £157; the difference in the two years being therefore £6499, the result of increased rentals, &c.

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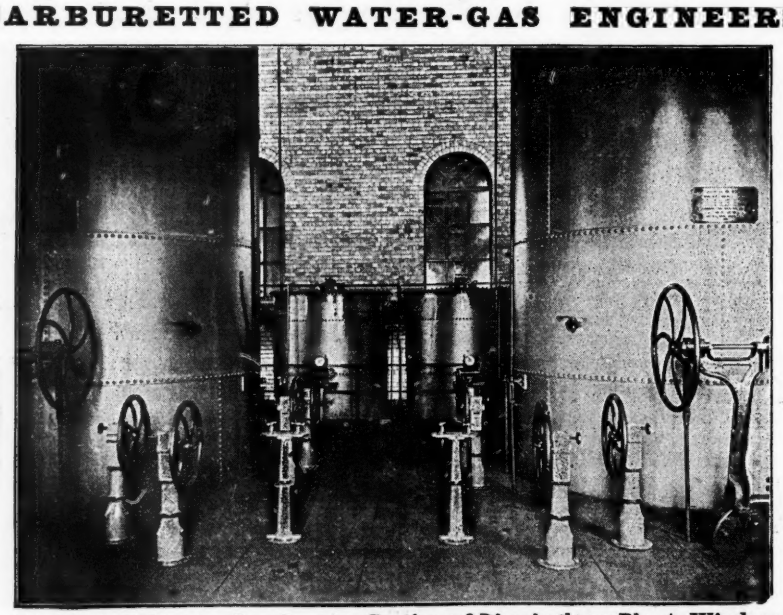

RESULTS PROVE EFFICIENCY.

Working Floor of Generator House. One Quarter Section of Birmingham Plant, Windsor Street Station.
The Maximum Daily Capacity of the Birmingham Corporation's Plant, which was erected by this Company, is 10 MILLION CUBIC FEET.

The Matlock District Council and the Water-Works.—The Matlock District Council last Thursday took over the undertaking of the Matlock Water Company, Limited, which has been in existence since 1860. The transfer took place by private agreement; the price paid being £18,550. The Council have obtained parliamentary sanction to the scheme for erecting a reservoir on Matlock Moor, to hold 110 million gallons. By this means it is calculated that provision will have been made for the supply of the town for the next fifty years, assuming the recent growth of the place to continue for that time at the present rate. The total cost of the works, with the purchase of the Company's interest, is estimated at between £50,000 and £60,000.

West Bromwich Gas Supply.—At a meeting of the West Bromwich Town Council last Wednesday, under the presidency of the Mayor (Mr. S. Pitt), the Gas Committee reported that the sales of gas for the midsummer quarter were 43,353,100 cubic feet; and that the amount of gas-rental (exclusive of public lighting) was £5208 15s. 6d. Alderman R. Farley (the Chairman of the Committee), in moving the adoption of the report, remarked that for the corresponding quarter of the previous year, the amount of the gas-rental was £4487 18s. 10d., which showed an increase of £720 16s. 8d. in the quarter just ended. The consumption of gas for the corresponding period of last year was 37,974,100 cubic feet; the past quarter's consumption being 5,379,000 cubic feet, or 15 per cent. more. The report was adopted.

The Annual Report of the Gas Engineer of Southport.—The Gas Committee of the Southport Corporation had a meeting last Tuesday, at which the report of the Gas Engineer and Manager (Mr. John Booth), which was withdrawn at the last Council meeting, was up for consideration. In the interval the report has been revised with the assistance of the Borough Accountant (Mr. George Lloyd); and there have been some re-adjustments of the debits and credits, but the main facts remain as stated in the original document (see *ante*, p. 162). In one page there is a tabular statement, by which a comparison may be easily instituted between this year's expenditure and income and those of last year. The net result shows that the actual cost of the gas last year was 2s. 4·25d. per 1000 cubic feet, as compared with 2s. 3·11d.—an increase of over 1d.; but there are several items which more than account for this difference. For example, the repairs to, and maintenance of, the mains and services last year cost 2·37d., as compared with 1·27d.; but the Committee have the satisfaction of knowing that less will be required in this direction during the coming year. Meter-rents have vanished altogether from last year's sources of revenue. There has been an increase of 0·24d. per 1000 cubic feet in the cost of public lighting; and in the charges for interest and sinking fund there has been an advance from 4·92d. to 5·63d. Balancing these items, it is evident there have been considerable improvements in other directions.

The Stockport Corporation Gas Committee and the Insurance Question.—In moving the adoption of the minutes of the Gas and Electric Lighting Committee at last Wednesday's meeting of the Stockport Town Council, the Chairman (Mr. T. Webb) made a statement with reference to the insurance of the men in their employ. He said the various insurance offices had been trying to get business, and had quoted generally as high as 25s. per cent.; the lowest rate being 10s. per cent. The Committee considered these prices very excessive; and he (the Chairman) had asked the Secretary to get out the amount that the Committee would have had to pay during the last six years for accidents for which they would probably have been liable under the new Act. It was found by these figures that the Committee were liable to an amount of only about 5s. per cent.; and deducting the recent accident at the Millgate works, only 1s. 10d. per cent. The Committee thought they should not insure with any Company under these circumstances, but start an insurance fund for themselves. He (the Chairman) attended a meeting in London called by the Mayor of Stoke, with a view of discussing the formation of an Association among Corporations for the insurance of their employees. This policy did not appear to be the wisest; and the Gas Committee therefore decided that, in view of the high rates of premiums of the various companies, and the apparent difficulties in working a joint municipal insurance scheme, they should establish a fund to meet all liabilities for accident to their employees. Their proposal was that a sum of £100 per annum should be paid thereto until the fund amounted to £1000, after which only the actual sums required—not exceeding £100 per annum—should be added to the fund.

Completion of the New Water-Works for Newark.—The Newark Corporation new water-works at Farnsfield, near Southwell, were formally opened last Friday by the Mayor (Mr. E. F. Milthorp). It has taken five years to carry out the undertaking; and the total cost has been £128,000. The pumping plant is capable of raising 2 million gallons per 24 hours from the wells. The water is pumped into a large reservoir on Edingley Hill, and thence is forced through 12 miles of pipes to Newark.

Hemsworth and District Water Supply.—Last Wednesday, the new reservoir which has been constructed for the supply of various populous parishes within the area of the Hemsworth Rural District Council was opened by the Vice-Chairman of the Council (Mr. J. Beckett Simpson) in the presence of a numerous company. The Engineer (Mr. J. H. Taylor) gave a brief description of the works. He said the reservoir was 81 feet long, 51 feet broad, and 13½ feet deep, and had a capacity of about 270,000 gallons. When full, the top of the water was 400 feet above sea-level. The land had cost £2300; and the remainder of the works, including some 26 miles of pipes, made up the total to £18,000. The water has to traverse 17 miles of mains from Ingbirchworth and Midhope before reaching the new reservoir, which is situated about two miles to the south of Hemsworth.

The Value of the Land Required for the Lowestoft Water-Works Extensions.—Last Tuesday and Wednesday, the Under-Sheriff of Suffolk (J. J. Sparke, Esq.) and a Special Jury sat at the Shirehall, Ipswich, for the purpose of assessing the compensation to be paid to Sir Savile Crossley, Bart., for the purchase of 44 acres of land and water at Lound, Belton, and Hopton, in Suffolk, which are required by the Lowestoft Gas and Water Company for water-works purposes. Mr. Cripps, Q.C., and Mr. Moon appeared for Sir Savile Crossley; Mr. Balfour Browne, Q.C., and Mr. Blofeld for the Company. According to Mr. Cripps, the land to be taken was worth to Sir Savile Crossley £100 an acre; and, therefore, assuming the area in question was 46 acres, the bare value of the ground would be £4600. Adding to this the usual 10 per cent., made £5060. Then the damage to Decoy Farm, and the question of access to water which the taking over of the land by the Company would cut off from the Decoy and Lodge Farms, would, Counsel said, have also to be considered. It was estimated that the cost of establishing an alternative supply to the former would be £430, and to the Lodge Farm £635, which would have to be added to the £5060 mentioned. Mr. G. M. Taylor and Mr. Walter Hunter were called to bear out the statements as to the water supply to the farms; and surveyors were afterwards called whose valuations for the land and compensation totalled to £8360 and £7317. On behalf of the Company, witnesses were examined who placed the total price, including 10 per cent. for forced sale, at figures ranging from £2070 to £2674. In the result, the Jury found that the value of the land was £2348, with £1050 as compensation for sporting and other rights—making a total award to Sir Savile Crossley of £3398.

Billing's Burner Syndicate, Limited, have supplied a large number of non-mantle incandescent gas-light burners for lighting the Washington Music Hall, Battersea, S.W.

The Milton-next-Sittingbourne Urban District Council have placed an order with Messrs. R. Dempster and Sons, Limited, of Elland, for one of their tower scrubbers; and the Stockport Corporation have entrusted the same firm with the contract for the oil-store tank and other apparatus recently advertised for in the "JOURNAL."

Among the many important contracts now in progress at the works of Messrs. W. J. Jenkins and Co., Limited, of Retford, is one recently placed by the Bolton Corporation for the coke-storing plant required at their Lum Street works, to be manufactured and erected to the designs of their Engineer, Mr. W. Smith. The same firm have also lately placed on their books an order from the Portsea Island Gas Company, for the conversion of a washer to the "Livesey" type.

Messrs. Burt, Boulton, and Haywood have, for family reasons, transferred their business to a limited liability Company under the title of Burt, Boulton, and Haywood, Limited. The authorized capital will consist of £225,000 of ordinary shares and £30,000 of 5 per cent. preference shares, with £145,000 of 4½ per cent. debentures. The whole of the present issue will be taken up by the partners of the old firm and one or two of the principal employees. The business will be conducted on the same lines and under the same management as heretofore.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

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[For Illustrated Advertisement, see Aug. 2, p. 278.]

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Tenders for the whole as they stand to be sent to the undersigned.
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W. BAILEY,
Secretary.

Dated Camborne, July 30, 1898.

HAWORTH URBAN DISTRICT COUNCIL.

THE above Council are prepared to receive TENDERS for the CONVERSION of an old STONE GASHOLDER TANK into a TAR and LIQUOR TANK, as per Plans and Specifications prepared by the Gas-Works Engineer.
Further Particulars may be obtained on application to the Gas-Works Manager, Gas-Works, Haworth.
Sealed Tenders, marked "Tar Tank," to be delivered to me the undersigned not later than the 26th of August, 1898.

WM. ROBERTSHAW,
Clerk to the Council.

1, Burlington Chambers, Keighley.

COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)

OXIDE OF IRON.

THE Gas Committee are prepared to receive TENDERS for the supply of 600 Tons of OXIDE OF IRON PURIFYING MATERIAL.
Full Particulars may be obtained on application to the Gas Engineer, Gas Offices, Bloom Street, Salford.
Sealed Tenders, endorsed "Oxide of Iron," addressed to the Chairman of the Gas Committee, Town Hall, Salford, to be delivered to me not later than Three p.m. on Wednesday, Aug. 17, 1898.

By order,
SAM. BROWN,
Town Clerk.

Town Hall, Salford,
Aug. 4, 1898.

NEWTON-IN-MAKERFIELD URBAN DISTRICT COUNCIL.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee of the above Council invite TENDERS for the surplus TAR which may be produced at their Gas-Works for a period of One Year from the 1st of September, 1898, to the 31st of August, 1899 (approximate quantity about 320 Tons), delivered in the Contractor's own Tanks, free on rails at Earlestown Railway Station (L. & N.W.).
Form of Tender may be obtained from the undersigned.
Tenders, endorsed "Tar," addressed to the Chairman of the Gas Committee, Town Hall, Earlestown, Newton-le-Willows, to be delivered at my Office not later than Aug. 20, 1898.
The Committee do not bind themselves to accept the lowest or any Tender.

W. W. SHIRLEY,
Clerk to the Council.

Town Hall, Earlestown,
Aug. 4, 1898.

URBAN DISTRICT COUNCIL OF OLDBURY.
(GAS DEPARTMENT.)

THE Gas Committee of this Council are open to receive TENDERS for the supply of 9500 Tons, or thereabouts, of best screened GAS COAL for delivery during the Year ending the 31st day of August, 1899, in such quantities and at such times as ordered, carriage free, at (1) the Oldbury Basin, Great Western Railway Company, and (2) London and North Western Railway, Oldbury.
Sealed Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Gas Coal," must be delivered to the undersigned not later than Saturday, Aug. 20 next.
The Gas Committee do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to apportion the whole quantity as they may think fit.
Tender Forms and any other Information may be obtained from the undersigned on application in writing.

By order,
A. COOKE,
General Manager.

Gas-Works, Oldbury,
July 30, 1898.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for 600 Tons of TAR.
Further Particulars and Form of Tender may be obtained from Mr. W. Whatmough, Gas Manager.
Tenders, endorsed "Tar," to be sent to me not later than Tuesday, Aug. 16, 1898.

By order,
J. H. BALDWICK,
Town Clerk.

Municipal Buildings, Heywood,
July 30, 1898.

LEIGH URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

THE Gas Committee of the above Council invite TENDERS for the purchase of the surplus TAR, produced at their Works for the Year ending the 31st day of August, 1899.
Further Particulars and Form of Tender may be obtained from the Manager, Mr. John Foster.
Tenders, endorsed "Tar," to be sent to me not later than Twelve o'clock noon on Monday, the 22nd day of August, 1898.

By order,
PEREGRINE THOMAS,
Clerk to the Council.

Town Hall, Leigh,
Aug. 5, 1898.

TO OXIDE OF IRON MERCHANTS.

THE Corporation of Birkenhead are pre- pared to receive TENDERS for the supply of 200 Tons of OXIDE OF IRON.
Forms of Tender and other Information may be obtained from Mr. T. O. Paterson, Gas Engineer, Gas-Works, Thomas Street.
Tenders, sealed and endorsed "Tender for Oxide of Iron," to be sent to me not later than Five p.m. on Friday, the 19th of August, 1898.
Deliveries to be made within one month of written instructions from the Gas Engineer.
The Corporation do not bind themselves to accept the lowest or any Tender.

By order,
ALFRED GILL,
Town Clerk.

Town Hall, Birkenhead,
Aug. 4, 1898.

BOROUGH OF ILKESTON.

THE Gas Committee are prepared to receive TENDERS for the supply and delivery at their Gas-Works of between 6000 and 7000 Tons of GAS COAL.
Conditions and Form of Tender may be had of the Manager (Mr. F. C. Humphrys), the Gas-Works, Rutland Street, Ilkeston.
Sealed, endorsed Tenders must be delivered to the undersigned on or before Monday, the 15th day of August next.
The Committee do not bind themselves to accept the lowest or any Tender; and they reserve the right to divide the quantity above named into two or more Contracts.

By order,
WRIGHT LISETT,
Town Clerk.

Town Hall, Ilkeston,
July 29, 1898.

CONTRACT FOR GAS COAL.

THE Milton-next-Sittingbourne Urban District Council invite TENDERS for the supply and delivery, during the Year ending the 23rd of August, 1899, of 1000 Tons of GAS COAL, to be supplied at such times and in such quantities as the Manager of the Gas-Works shall direct.
Full Information, with Form of Tender, can be obtained on application to the Manager, Mr. A. Davison Gas-Works, Milton-next-Sittingbourne.
Sealed Tenders, which must be on the form supplied, should be addressed to the Chairman of the Milton-next-Sittingbourne Urban District Council, and endorsed "Tender for Gas Coal."
The Tenders should be sent or delivered to me on or before Monday, the 22nd day of August, 1898.
The Council do not bind themselves to accept the lowest or any Tender.

By order,
WM. PARHAM,
Clerk.

Milton-next-Sittingbourne,
July 28, 1898.

BOROUGH OF BURTON-UPON-TRENT.

TO RETORT SETTERS.

THE Corporation of Burton-upon-Trent invite TENDERS from competent persons for the supply, construction, and erection of the FOUNDATIONS, ARCHES, FIRE-BRICKWORK, and FURNACE IRONWORK for Nine Through Beds of RETORTS, heated on the Generator or Regenerator System.
Persons tendering must submit with their Tender Drawings and Specification of the System which they propose, and must state where similar Systems are in use.
Further Particulars may be obtained, and the Drawings of the Retort-House inspected on application to the undersigned, to whom Tenders, endorsed "Tender for Retort Setting," are to be delivered at or before Ten a.m. on Wednesday, the 31st of August inst.
The Corporation do not bind themselves to accept the lowest or any Tender, nor will they pay any Expense or Charge relating to the making or delivery of the same.
No Tender will be accepted from any person or persons who pay to his or their employees, whether artizans or labourers, less than the Standard Rate of Wages paid in this Borough, or who do not conform to the Hours and Conditions of Labour generally recognized in each branch of industry affected; and a clause to ensure compliance with this regulation will be inserted in the contract.

F. L. RAMSDEN,
Manager and Engineer.

Gas and Electric Light Works,
Burton-upon-Trent, Aug. 1, 1898.

BOROUGH OF CHORLEY.

THE Chorley Corporation invite Tenders for the purchase of the surplus TAR produced at their Gas-Works for Twelve Months commencing the 1st of September next, delivered in the Contractor's Tanks at either of the Chorley Railway Stations.
Any further Information may be obtained from Mr. Jno. M'Cubbin, Gas Manager, Chorley.
The Corporation do not bind themselves to accept the highest or any Tender.
Tenders, endorsed "Tar," to be sent to me on or before Tuesday, the 16th inst.

By order,
JNO. MILLS,
Town Clerk.

BROMLEY GAS CONSUMERS' COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the White Hart Hotel, Bromley, Kent, on Thursday, the 11th day of August, at Six o'clock p.m. precisely, to receive the Report of the Directors, the Balance-Sheet certified by the Auditors, to declare Dividends, and for General Purposes.
The TRANSFER BOOKS WILL BE CLOSED from the 29th of July to the 11th of August, 1898, both days inclusive.

By order of the Board,
HENRY W. AMOS,
Secretary.

Offices at the Works:
Bromley, Kent, July 28, 1898.

COLNEY HATCH GAS COMPANY.

NOTICE OF GENERAL MEETING.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, New Southgate, on Thursday, the 25th day of August inst., at Five o'clock in the Evening precisely, to receive the Report of the Directors, and the Accounts of the Company for the Half Year ended the 30th of June, 1898, to declare Dividends, to consider the Remuneration of the Secretary, and for other purposes.

By order,
ERNEST L. BURTON,
Secretary.

Secretary's Offices: 5, Great Winchester Street, London, E.C., Aug. 5, 1898.

RIDDINGS DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY MEETING of the Shareholders of the above Company will be held at the Offices of the Company, No. 80, Gracechurch Street, in the City of London, on Friday, the 26th day of August, 1898, at Three o'clock in the Afternoon precisely, to receive the Report of the Directors and the Accounts for the Half Year ending the 30th day of June last, to declare a Dividend, and to transact the General Business of the Company.
The TRANSFER BOOKS WILL BE CLOSED from the 13th to the 26th of August, both inclusive.

By order of the Board,
ALFRED LASS,
Secretary.

Offices: 80, Gracechurch Street, London, Aug. 4, 1898.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.
He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.
Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

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Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·4 candles.
Coke	68 per cent.

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BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per ton	10,500	Cubic Feet.
Illuminating Power	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to

W. H. PARKINSON,

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Telegraphic Address: "PARKINSON NEWCASTLE."

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Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton	10,500 Cub. Ft.
Illuminating Power	16·9 Candles.
Coke (of good quality)	67·5 per Cent.
Sulphur	0·58 „
Ash	2·78 „

For Price, &c., apply to the

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Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton	11,205 Cubic Feet.
Illuminating Power	16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality)	13¾ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

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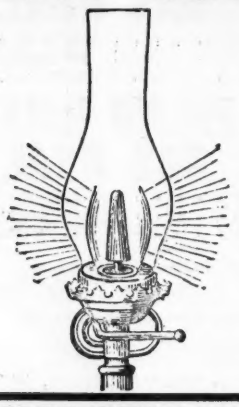

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R. F. HISLOP, Gas Engineer, CRAIGIELEA, PAISLEY.

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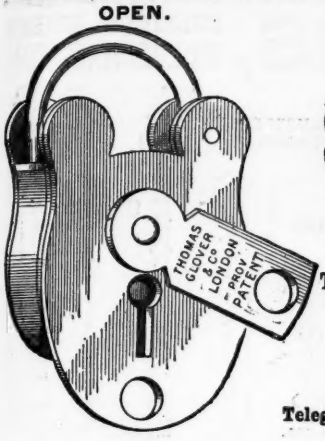

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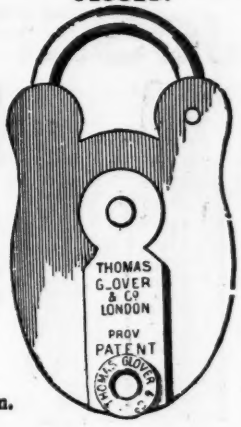

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BIRMINGHAM: 1, OOZELLS STREET. *Telegraphic Address: "GOTHIC"*

MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address: "GOTHIC."* Telephone No. 3895.

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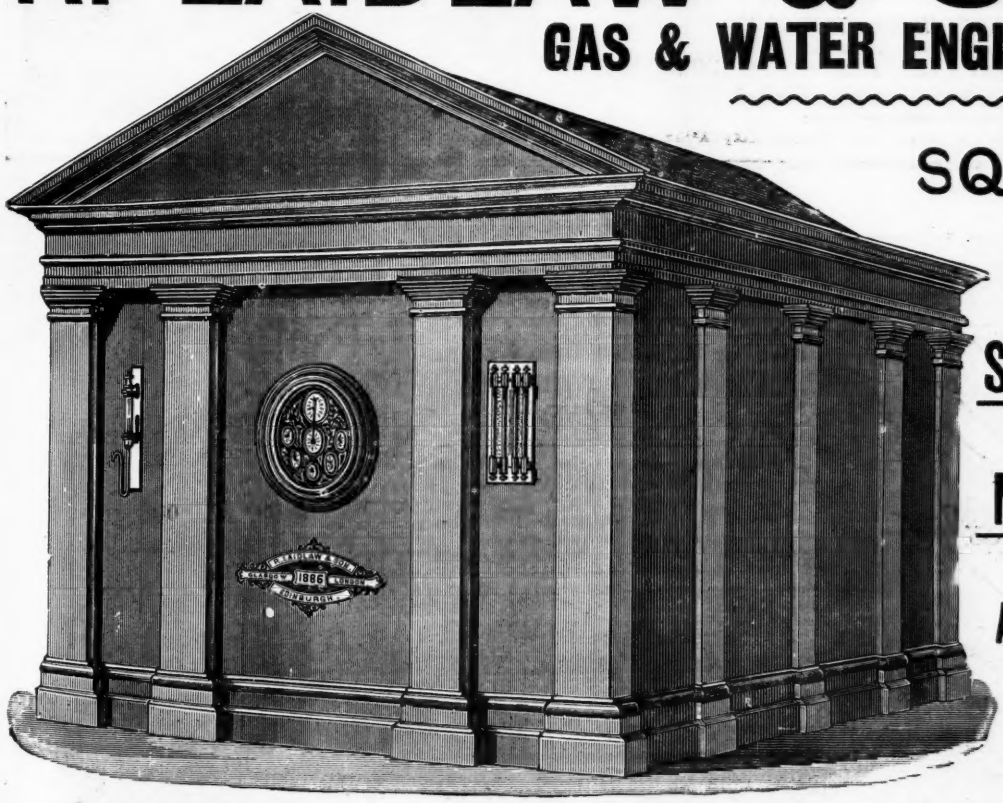

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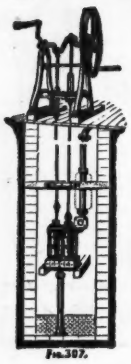

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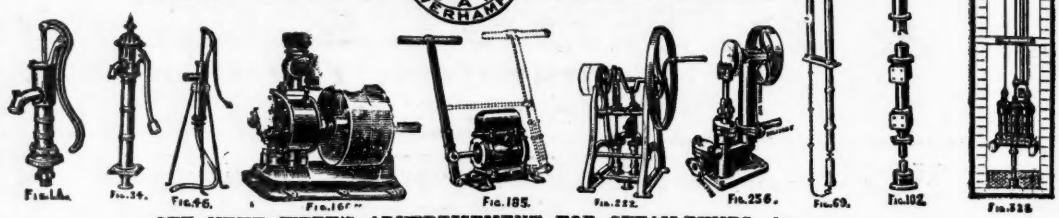

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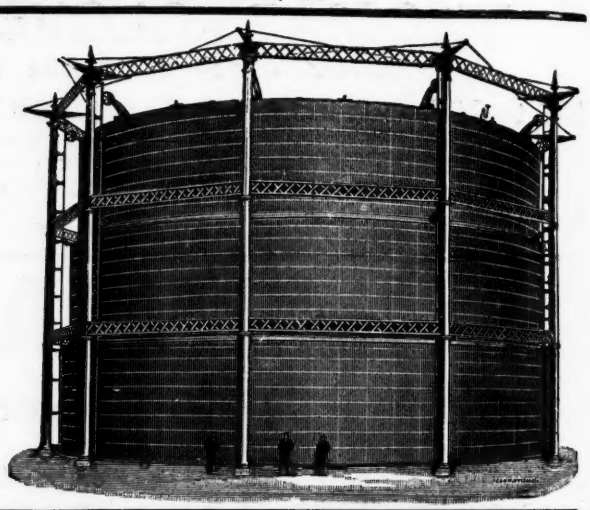

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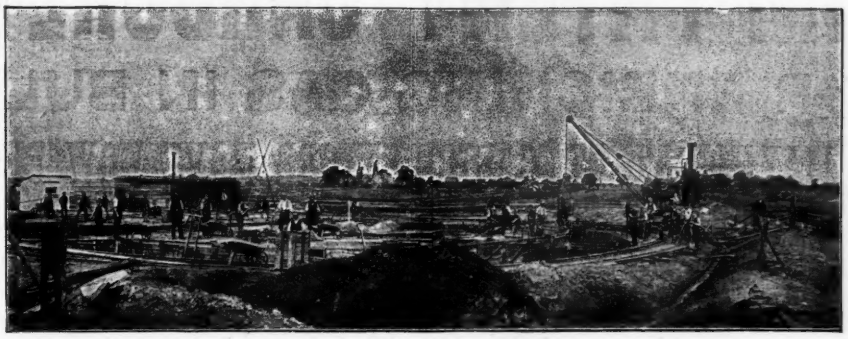

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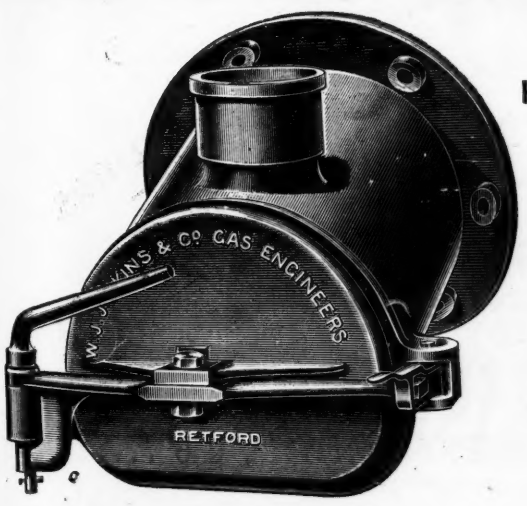

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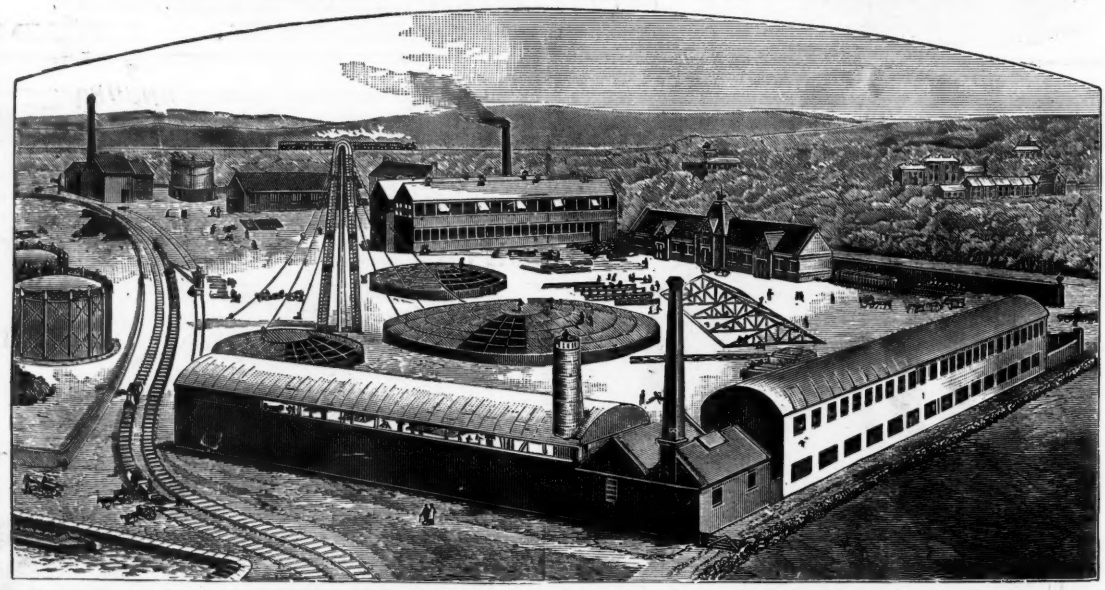

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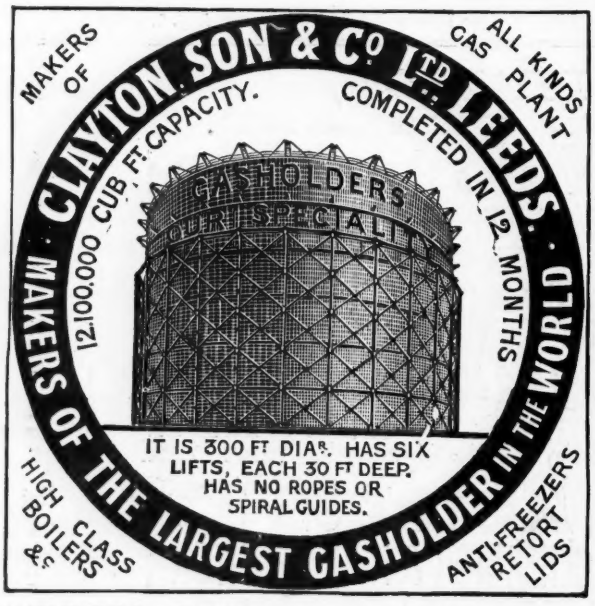
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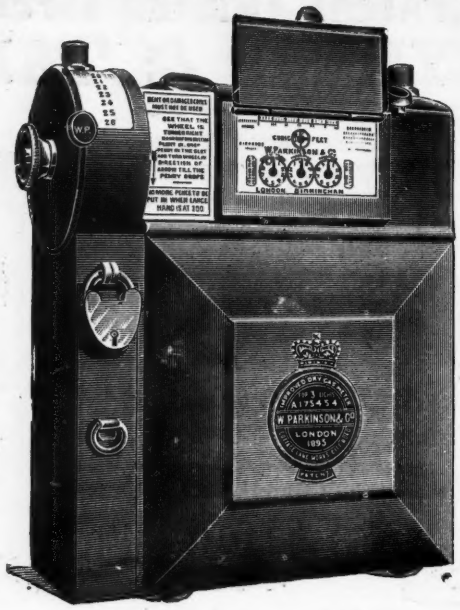

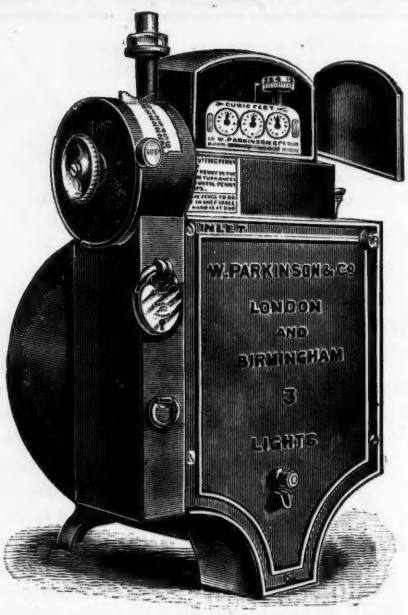

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[See also Advt. p. 296.

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